CHEMICAL LIBRARY
OCT 17
UNIV. OF MICHIGAN LIBRARY

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXXXIX. No. 2835.] LONDON, SEPTEMBER 11, 1917. [69th Year. Price 6d.

O'NEILL'S

OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.

PALMERSTON HOUSE, LONDON, E.C.

Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.

CAST-IRON OR STEEL TANKS
Any Capacity.

CHEMICAL PLANT.

Roofs and Girders. Structural Work.

SULPHATE OF AMMONIA PLANT

Air and Gas Compressors.

MIXERS.

TAR STILLS AND CONDENSERS.

W. NEILL & SON, Ld.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 20.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.

SPENT OXIDE PURCHASED

J. BROWN & CO., Ltd.
Savile Town, DEWSBURY.

TORBAY
METER
ENAMEL.

The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)

John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.

ASHMORE, BENSON, PEASE & CO., LTD., STOCKTON-ON-TEES.

Complete GAS WORKS

London Office:
39, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),

LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.

(See Advertisement on page iii. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
89, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1865.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

ESTABLISHED — 1861 —

Telegrams:
"DRY METERS, LONDON."

Telephone:
KENSINGTON, 1140.

George Glover and Co., Ltd.

RANELAGH WORKS
Royal Avenue, Chelsea
LONDON, S.W., 3.

Highest Awards at the Principal International Exhibitions.

Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.

Every meter leaving George Glover and Co.'s works, irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.

AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.

RITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.

HENRY WRIGHTSON, & CO., Ltd. SOLE MAKERS OF THE NOTTA ROD & COAL WASHER.

Every Mantle manufactured and supplied by the Welsbach Light Co., Ltd., is

BRITISH MADE

by British labour at the Welsbach Factory at Wandsworth, London, S.W. 18.

Welsbach Mantles have stood the test for well over a quarter of a century, and to-day are in greater demand than ever —a proof of their reliability.

THE ORIGINAL AND STILL THE BEST

The WELSBACH LIGHT CO. Ltd., Welsbach House, King's Cross, W.C. 1.
And at Birmingham, Bristol, Dublin, Hull, Leeds, Manchester, and Stoke-on-Trent.

THE

BRYAN DONKIN COMPANY, LTD.

SPECIALISTS IN

HIGH PRESSURE GAS DISTRIBUTION.

PIONEERS IN THIS COUNTRY.

OVER 200 PLANTS SUPPLIED FULFILLING ALL CONDITIONS.

We shall be pleased to send one of our Experts to advise.

OUR PATENT DISTRICT GOVERNORS reduce from any pressure on the inlet up to 50 lbs. per square inch in one stage, down to the ordinary district pressure, and the low pressure is maintained constant, independent of all variations in demand and in the pressure on the inlet side.

HIGH & LOW PRESSURE SERVICE REGULATORS.
REGULATORS FOR METERS, GAS FIRES & STOVES.
PATENT DOUBLE FACED GAS VALVES FOR HIGH & LOW PRESSURES
RATEAU TURBO GAS EXHAUSTERS FOR BOOSTING, &c.
ROTARY & RECIPROCATING COMPRESSORS.

Head Office and Works: CHESTERFIELD.

London Office: MILLBANK HOUSE, Wood Street, WESTMINSTER, S.W.

Chesterfield Telephone No. 84.
London Telephone No. 8368 Victoria.

Chesterfield Telegrams, "Donkin Chesterfield."
London Telegrams, "Donkin Vic. London."

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXXXIX., No. 2835.] TUESDAY, SEPTEMBER 11, 1917. [69TH YEAR.

EDITORIAL NOTES.

The Needs and Instructions of Government Departments.

THE war has hurriedly created a Government organization of immense proportions; and it could not be expected that such a ponderous piece of machinery could be brought into existence with such precision that the cogs of the wheels would all fit and run without friction. More especially is this the case with a war of such dimensions and ramifications as this, with the fluctuations that it produces from day to day, and with requirements following suite. Those behind the scenes—the Admiralty, the War Office, and the many departments organizing and supervising the work and provision of the necessaries for the war—are the only ones who know what is the precise position of things. Whether confidences always pass from one department to another with the exactitude that there should be with the object of securing thorough organization and satisfaction—say, in the matter of supplies—is, so not a few observers think, open to question. If this is true, then it explains much. There has been somewhat frequent exemplification of the instructions of one Government Department being seemingly, and in fact have been, opposed to those of another. This sort of thing can only be avoided by intercommunication and full confidence. There is another means by which trouble may obtain. It is, when a certain situation arises, by passing imperative instructions from one department to another, without complete conference, and their transmission for execution outside, where the great powers possessed by the instructing Departments under the Defence of the Realm Act are always present as an incentive to do the bidding of the Departments concerned without any question whatever or with as little as possible. Between the gas industry and the Explosives Supplies Department there has always been the greatest amity. The Explosives Supplies Department is a division only of the Ministry of Munitions; and the Ministry of Munitions is the servant of all the other Departments concerned with the war. We can understand that it may receive instructions as to an imperative necessity, with an intimation that a certain line of action must be taken at any cost. Its machinery would at once be set in motion with the gravity of the position concentrated on the "must." In the case of the gas industry, and to set it in motion, the channel of communication would be the National Gas Council, who are practically helpless in face of insistent instructions having their source in one of the superior Government Departments. The Council are, in the circumstances, a convenience to the Government Departments; and, in the circumstances, if anything goes wrong, it is the most handy of the participants for the gas industry to reproach. The position is not always a comfortable one; and still less so in these times of quick decisions and action. This must be remembered, as well as the fact that the National Gas Council is a body that is subordinate to a Government Department.

The Sliding-Scale and Relief.

THE question of securing some relaxation of the terms of the sliding-scale temporarily (where required), during the war and permanently after, is one which cannot, in the best interests of the gas industry, be allowed to be cast aside. Of course, if all companies were in equal position, the matter of a temporary revision would be relatively an easy matter. But they are not. Some have high standard prices; and the fortunate share or stock holders in them are not suffering in nearly the same degree as in the case of other companies. Other conditions—such as low capital charges—also help to make differences between companies in respect of the effects of the war. However, it is those companies that have been hardest hit through their peace-time legislative ordinances that require immediate relief; and the question is which is the best way of accomplishing this. We understand that the Executive Committee of the National Gas Council will early next month be considering the results of an investigation that has been made into the matter, and which will disclose—if there has been a general compliance with the request for certain returns—a considerable amount of hardship on the holders of gas capital. There will, no doubt, likewise be before the Committee various suggestions for dealing with the situation. To these a contribution was made by Mr. A. M. Paddon at a meeting of the proprietors of the Brighton and Hove Gas Company last Friday, when he proposed the institution of a neutral zone of 4d. within which the standard dividend should not be affected. This would be hardly enough in some cases. However, it is presented for consideration with the rest.

But there is another point that has to be met, and that is the reported representation of the Board of Trade that every individual case would have to be considered, and that this is too vast a business for them to undertake during the war. But not all gas undertakings require relief; and if there were the will, a way would sure to be discovered. The Board of Trade has to be shown the seriousness, urgency, and justice of the claims of the gas industry; and no one knows better than the Board that it has only to agree that something should and must be done, and early means for doing it would be found. Little trouble was made over the Gas (Standard of Calorific Power) Act—in passing it through Parliament, and in giving it operative effect.

Last week we pointed out that, with the view of dealing with extraordinary circumstances arising in other directions from the war, special committees have been appointed, special departments have been formed, and special means have been devised and adopted. Why should not the Board of Trade appoint a specially qualified body of Referees for dealing with the matter of revising the sliding-scale in those cases where necessary—to operate during the period of the war, and for a time after? Precedents are deemed useful things among the Private Bill Authorities and in Government Departments, in which work is largely conducted by the rule of precedent. Then let us go back to the City of London Gas Act, 1868; and there are found what were known as the "Revision Clauses," one of the purposes of which was to ensure that the maximum price of gas should always be correctly fixed. On an application being made for a revision of price under that Act, the Board would appoint for the purpose three qualified Commissioners, who had the power to inspect works, order the attendance of witnesses, call for books and papers, and obtain legal and other assistance. Further information regarding this precedent is to be found in (the late) Mr. Laurence Rostron's book on "The Powers of Charge of the Metropolitan Gas "Companies." Of course, the purpose is not exactly the same; but the idea as to the tribunal might be useful when preparing a plan which would meet with the acceptance of first the Board of Trade and then of Parliament. In this matter, we have taken our stand upon common justice; and the case that can be presented in support of parliamentary action to secure justice is, we believe, both a sound and an unanswerable one.

The Geographically Re-Arranged Coal Contracts.

FOR delivery of coal under contracts, the redistribution scheme of the Coal Controller (Mr. Guy Calthrop) entered actively upon its work as from six o'clock last Saturday, by abrogating all pre-existing coal contracts, except those referring to coal produced and consumed within the same area, seaborne coal, and those for railborne coal which fortunately complied with the plan. For those whose contracts have had to be cancelled, and new ones effected, the time since the promulgation of the scheme early in July has been rendered by it doubly eventful. On the one hand, there has been a struggle to get in as much coal as possible under the now non-existent contracts; and, on the other hand, there has been the fixing-up of the new contracts for coal from the authorized fresh sources. This, in some instances, has not been an easy matter, even with the assistance of the reinforced Coal and Coke Supplies Committees; and now numbers of gas engineers are concerned as to the character of the coal with which later on they will be working. Most engineers with whom we have come into contact have got in good stocks under their old contracts; and many of them have expressed satisfaction with the way in which their contractors have been helping them during the summer months to accumulate stocks of the brands of coal which they know. With the shifting about of the contracts, to avoid prohibited relationships and to establish new, there will undoubtedly be some works that will get coal of an inferior quality for gas and secondary products making than that to which they have been accustomed, while with others the contrary will be the case; and these changes will have, or rather they may have, their money disadvantages. Some engineers are anticipating this with anything but comfortable feelings. But at the same time, they realize that it is only sheer necessity that commands the economizing of railway transport as far as possible during the winter months, and that such a vast rearrangement could not possibly be brought to pass without some attendant trouble. To have planned and brought into existence a scheme that went like a piece of perfect mechanism would have been a superhuman performance; and Mr. Guy Calthrop claims to be as human as the rest of us. His scheme has been developed for a special purpose; other purposes have had to suffer. The proof of the practicability of the project for the special purpose is entering upon its test; and we may hope that it will assert that the Coal Controller has been right, and his critics wrong. Otherwise there will be chaos just in the season when the smoother the working of coal despatch, transit, and delivery, the better. Truly, the Coal Controller has taken a bold step; and now for its justification.

The North British Presidential Address.

THE President of the North British Association of Gas Managers (Mr. J. Lang, of the Vale of Leven Gas Company) was in happy and optimistic mood at the meeting in Glasgow last Friday. We have all got our war difficulties to face; and gas engineers and managers have had not the smallest apportionment of them. But Mr. Lang comforts himself with the old Scotch saying: "There's never a bad, "but there could be a waur'." A genial disposition that which finds trouble the lighter by the thought that it might be worse, and happier still the one who cheerfully faces war-time difficulties stimulated by the fact that, in so doing, he is performing his allotted part in working for the defeat of the enemy. At the same time, the best use must be made of the industry's opportunities to its permanent advantage. Lord Moulton last June paid a handsome tribute to what the industry has done in saving the nation from the threatened terrible consequences of inexcusable negligence. This tribute ought, Mr. Lang thinks (and we fully agree) to have a large publicity among the customers of every gas undertaking. By the reproduction of the tribute on a leaflet, or on the back of the next gas accounts, there could be fulfilment of the wish.

That, however, was a certificate to good character by one who is doubly qualified to give it; but another certificate to the potentiality of the industry is found in its actual war-time work. Whatever the local circumstances of gasmen, there is unanimity in agreeing that what the gas industry is doing will be to its permanent advantage. Undoubtedly this is so. But the degree of this permanent advantage will, to a very considerable extent, be governed by the means taken to promote it. The industry has secured a decided lead by the very facts of availability, ease of adaptation, and results. Mr. Lang, as Engineer and Manager of the Vale of Leven Gas Company, has given what is, we should imagine, a unique proof of this for an undertaking of the size of that under his management, and to no less a firm than that of Messrs. Sir W. G. Armstrong, Whitworth, & Co. They wanted gas for munition purposes; and it was the Gas Company's business to supply it. And though it has meant in two years more than doubling the business that had been built up during the whole life of the concern, it has been done. There is one regrettable circumstance—and Mr. Lang is not the only manager who has reluctantly had to come to a like conclusion—which is that munition requirements have compelled the cessation of the installation of gas cookers and other appliances. The reason for the temporary abandonment of new business in this direction is not the same in all cases; but whatever the reason—munition works requirements, gas-producing capacity, coal, labour, or what not—the pity of the rejection or filing-away of the applications is that these would all have meant permanent business. However, the position cannot be helped. It is a question of making the best possible of it, and utilizing personal effort, when conditions again undergo change, in recovering the proffered fresh custom.

The war experiences of the Vale of Leven Gas Company make quite a good story; the war experiences of the gas industry of Scotland generally have brought to the front schemes for departures from existing co-operative circumstances. The Home Rule scheme for the Scotch gas industry appears to be strongly in the ascendant—not through separation from the National Gas Council, but through a Council composed as described in the address, and one which should work for Scotland in conjunction with the National Council. We have before discussed this point. There are attendant advantages and disadvantages. Among the advantages are that a Scotch Council would be in close touch with the requirements of Scotland; and it would relieve the National Council from some of the detail work appertaining to the industry north of the Tweed. This is being written before the report of the discussions at the meeting has reached us; and there may be later on a call for further reference to the subject. Another innovation is the appointment of Mr. Gemmel, of Edinburgh, as the Chemist and Analyst for those undertakings that have not a chemist as a member of their own staffs. A schedule of rates at which Mr. Gemmel will test samples has been agreed upon. Of course, benefit will be found in having a recognized chemist whose work will keep him specialized in the needs of the gas industry. This scheme, however, is in substitution of the provision of a central gas laboratory in Edinburgh or Glasgow, which was found by the Council of the Association to be rather too ambitious for consideration at the present time.

Continuous Verticals in a Fifty Million Works.

THERE is a strictly impartial tone about the paper that Mr. H. G. Ritchie, of Irvine, read before the North British Gas Managers' Association last Friday. It was a frank statement of his experiences with an installation of Woodall-Duckham continuous vertical retorts. He praised where praise was due; he did not refrain from placing on record the modest difficulties he had experienced, and his views as to the suitability of such settings for works of no greater output than his own. But the final result is the basis for judgment. Mr. Ritchie's experience is that, though vertical retorts do not eliminate all worries, and they require more skilled supervision than the ordinary stoker is capable of, the reduced anxieties due to labour troubles have amply compensated him for the extra attention he has to give to the vertical retort installation.

The paper—which must be taken as a whole, and not any one part skipped, or an injustice may be done to the system—demonstrates that the continuous vertical retort system is applicable to quite small works, as well as to large ones. There are only six 3-ton per day retorts, which have a guaranteed output of 250,000 c.ft.; but without pressing, and without the use of blue water gas, Mr. Ritchie has secured over a month an average daily output per retort of 50,200 c.ft., or equal to a total of 301,200 c.ft. The maximum day's output per retort has been 59,000 c.ft. The figures indicate that the contractors believe in a good margin of safety in respect of their claims. But even these considerable figures over the guarantee could be largely

exceeded, if it were an economy to purchase a still better class of gas-making coal. Coking nuts are being carbonized; and a make of 12,039 c.ft. of 520 B.Th.U. gas is being obtained, which is 2337 c.ft. better than with the old horizontal working. The first results recorded in the paper are very indifferent ones; and for a simple cause which the author shows was capable of remedy in a simple manner, as explained in the paper. From this instance, the lesson may be drawn that it does not always do to look to big things for the cause of disappointment; it is often the case that it is something trifling that creates disturbance and adverse results. From the last set of tabulated figures in the paper, it will be noticed that, with different classes of coal, considerable make variations have been obtained by the setting; and we only mention this to enforce the elementary, but often forgotten, point that judgment should not alone be based on ordinary working experiences with any carbonizing system without taking into account the quality of the coal employed, an analysis of which in this case is missing from the paper. But from the same set of figures, another interesting feature protrudes; and it is that with any class of coal, with continuous vertical retorts, the make can be regulated to a nicety, so as—providing temperatures are sustained—automatically to keep approximately to the calorific power desired. It will be observed from the data how, with the different varieties of coal, and the different makes per ton, the calorific power does not widely diverge. This is largely due to the fact that a nice adjustment of the rate of speed of the travel of the charge in relation to the character of the coal is possible through the medium of the coke-extractor; and this also gives an elasticity to producing power which is particularly valuable to smaller works the conditions of demand upon which do not necessitate a considerable margin of retort power. The amount of coke for sale—about 7½ cwt. per ton of coal—appears to be rather low, and suggests a fuel account equal to that of the old horizontal settings which were in "very bad order."

The Ministry of Munitions are desirous just now that, as far as possible, coal shall be carbonized for gas making in order to produce the maximum supply of fuel oils. But this does not detract from any current contribution to the economic question of the supplementing of make by steaming or the addition of blue-water gas. Mr. Ritchie during the past week has been making experiments with steaming in one of his vertical retorts; and, from a make of 12,039 c.ft., he has gone up to one (with steaming) of 13,363 c.ft.—an increase of about 11 per cent., while the calorific value has only suffered by 2 p.ct. This is good; but it is a question whether it cannot be bettered. It is the opinion of the author that it could be if the hottest zone was further down the retort; and this could be arranged without much structural alteration by carrying the secondary air supply lower down the retort. This closely agrees with the contention of Mr. J. E. Blundell, of Macclesfield, that the hightest temperature should be towards the bottom end of the carbonizing portion of the retort [*ante*, p. 106].

Of course, capital costs are at all times a consideration to any gas-works, and especially to one of limited opportunities. Just now, particularly, one cannot afford to waste money, nor even to consult one's fancies if useless expenditure is to be the result. Vertical retorts, however, lend themselves more especially to light constructions; and Mr. Ritchie illustrates how, in order to economize in building, he has had the vertical setting installed in an old coal-store, and has continued such protection as is necessary with a very light and comparatively inexpensive structure. Economy in non-productive capital expenditure is quite a legitimate thing; but it must be said that round and over the modern types of plant, we do like to see a harmonizing building wherever possible. The light steel-framed buildings that are now erected for this purpose answer admirably, and cannot in normal times be accounted expensive or a waste of money. However, that merely by the way. These are not normal times; and needless expense in them has no justification. Mr. Ritchie and his Company must be congratulated upon their enterprise; and they are quite satisfied that they have done the right thing, which is the main consideration.

The Crudity of the Dehydration Process.

VERY few gas engineers, and certainly no gas chemists, have been inclined to give tar dehydration plants that have been so largely installed on gas-works credit for more than they are worth. They have been of considerable value during the war, and have greatly facilitated work for the Ministry of Munitions, have economized in crude tar transport, and have placed at the disposal of the road authorities close to the points of tar production the refined tar to the use of which they are limited by the central authorities. While the plants have been highly serviceable, no one would attempt to match their efficiency against that of complete and properly supervised tar-distillation plants. However, if any one has been under any misapprehension as to the status of the dehydration form of plant, he will find himself set right in a very instructive paper that Mr. G. H. Sharples, of Glasgow, read before the North British Association last Friday. The dehydration plant is shown by comparison with distillation plant, through analytical data, to be a crude and wasteful process. Nevertheless it has its useful place, and has served its useful purpose, and will continue to do so in many places not equal to the installation of tar-distillation plants, or where co-operative work is impossible, or where the trading tar distiller is not reasonably fair to the producer. The dehydration plant is, we believe, the first step to large developments in the gas industry. Mr. Sharples shows by his data wherein the dehydration plant fails. Take two points only—naphtha and tar acids. In the dehydrated tar there remain considerable quantities of naphtha; and in the lighter portion of the heavy oils left in the dehydrated tar is found a large quantity of tar acids. These are examples of the general inefficiency. The practice of rectification in small stills is also condemned. "No "real separation into the pure products—benzene, toluene, "xylene—could be made in these small stills." This has been quickly realized; and in many cases the crude oil is now turned over to the tar distiller for treatment.

The case presented in the paper is perfectly true; but it does not alter the fact that many gas-works are now doing better commercially with their tar than they would be if they handed over to the tar distiller the whole of the crude stuff. It is the commercial side to which they have to look; and keeping this steadily in view, there are bound to be developments from the present position, in accordance with the (to the producer) most profitable utilization of the tar. In the comparison made by Mr. Sharples in the first table, as to the composition of the tar yielded with the same class of coal by two different works, but at the one carbonized in horizontal retorts and at the other in vertical retorts, we hardly think the figures can be taken as representative of heavy-charge working in horizontal retorts, with the free space limited; and therefore the figures, if our surmise is correct, would not be quite fair to contemporary working with horizontal retorts. At the same time, generally speaking, with the best horizontal working, the quality of the tar does not, as a rule, come up to that of the vertical retorts in the matters of light oils and creosote oils, and the lower quantity of pitch. But for the purposes of the war, owing to the "paraffin" reasons disclosed in the third table, the products of the horizontal retorts are preferred. The point is also raised by the author as to whether, having in view the making of pure products, it would not be advisable to work-up separately the tar from horizontal and vertical retorts. It no doubt would be. But there are practical difficulties at many works in regard to separate tar storage; and unless there was some sufficient return to the tar producers to justify the separation, it would not, in the majority of gas-works, pay to carry-out the suggestion. In large gas-works, with considerable installations of both systems, the case would be different.

A Tightened Control over Tar.

Not long ago, there was an Order as to creosote oils; since then one has been issued in reference to "crude benzol, crude naphtha, and light oils;" and now comes one as to coal tar—the secret of all this being that the Ministry of Munitions must have complete control and use of certain of the products of tar distillation. Fuel oils is an essential of considerable importance. The new Order as to tar is a stringent one; and it will interfere somewhat with the freedom of trading in both crude and dehydrated tars without a Licence from the Ministry of Munitions, excepting as between producers and distillers. The sale of crude tar has to all intents and purposes been prohibited from the first year of the war, through the reservation to themselves originally by the War Office and then by the Explosives Department of the Ministry

of Munitions, of all tar substances containing toluol. But for a time there were leakages in the direction of road use; and this resulted, towards the end of 1915, in the Road Board being requested by the Ministry of Munitions to see that arrangements were promptly made which would absolutely prevent the use of crude tar on highways and footpaths during the continuance of the war. We think it may be said that fairly generally there has been compliance with this request. But gradually the Ministry has found it necessary, owing to requirements, to get a still closer grip over production and disposal. Last year there came the request for returns as to production, stocks, &c. Now from the 1st prox., no person will be allowed to purchase or offer to purchase any coal tar—whether crude or dehydrated—without a Licence by the Ministry of Munitions. Exception is made in the case of tar distillers for the purchase of crude tar provided it is to be distilled by them. But no transactions may take place by a tar distiller in resulting treated tar without a Licence, save under a condition which applies generally and to both crude and dehydrated tar in small quantities. This allows transactions without Licence in quantities not exceeding 10 gallons, provided the total purchased in any one calendar month does not exceed 50 gallons. The new Order is printed *in extenso* in another column; and particular attention should be paid to the fact that current contracts are not exempt from control under the terms of the Order.

From the Land to the Gas-Works.

From the British gas-works to the land of the farmers there has this year passed very many thousands of tons of sulphate of ammonia, at a modest price under the conditions of its production. The fertilizer has caused the earth to yield her increase, has brought more profit to the farmer, and has necessitated a large number of additional hands for the harvesting. Harvest time will soon be over. From the land the hands specially engaged for the reaping will soon pass, and will be taking up some fresh employment. One good turn deserves another. The gas industry will soon be wrestling with its annual peak-loads under all the unfavourable conditions that an evil ingenuity could possibly marshal. One of these unfavourable conditions is labour. The gas industry will want more; and it will, if help is not rendered, be very difficult to get. Cannot those Ministers who have been so considerate to the agricultural industry at the expense of a heavily burdened gas industry do something to mobilize these farm hands and transfer them to the assistance of the latter during the days of its greatest pressure? Whatever the character of the work such hands undertake in connection with gas operations, they will be helping to contribute to the production and stocks of sulphate of ammonia for next year's agricultural work and developments. Providing, too, the Coal Controller can arrange for adequate coal supplies, the transferred farm hands would be doing a part to enable the gas industry to supply more gas, and thus more benzol and toluol, fuel oils, and the many other requirements of the Ministry of Munitions. We hear of gas undertakings which are, as a precautionary measure, declining to fix more gas-heating appliances, so that those already connected may not have to go short of gas. The boundary set by plant capacity to the public services of a gas-works is an unavoidable obstacle; but in some cases the deficiency of labour upon the works is an important factor in their supply conditions. Where relief can be given in this direction, it will be for the public and the national good. The less gas the industry supplies in winter, the more coal will be consumed in households. And that coal is the most labour-consuming of any fuel right away from the coal truck or ship's hold to the domestic grate; and all the coal contains is dissipated, with the exception of about 20 per cent. of its heat value. It should need no argument to show how much the economy of the nation can be served and paramount needs satisfied, by giving the gas industry all the labour that it can usefully absorb. Hence the suggestion that gas-works labour should be recruited from those farm hands whose harvesting services will now soon be ended.

Coal Factors' Prices.

The negotiations that have been pending between the Coal Controller and the coal factors and merchants have come to an end; and the decision as to the excess prices that they may charge are now embedded in what is called the "Wholesale Coal Prices Order," which was issued last week. The excess figures (as will be seen elsewhere) are practically the same as those reproduced in our columns lately [*ante*, p. 321] from the "Iron and Coal Trades Review." But the anticipated conditions attached to the prices have perhaps undergone some modification. The prices practically cover all sales through factors and merchants for inland consumed coal in Great Britain and Ireland. The excess price is upon the pit charge, or, in the case of washed fuel the price chargeable for the fuel at the washery by the owner of the fuel by whom, or on whose behalf, it was washed. The actual cost of transport is to be charged; but in respect of transport no profit is to be made, inasmuch as in this cost "no charge shall be made by the seller of the coal in respect of office expenses, salaries, or other overhead charges or loss in handling." As to the extra charges, these are not to exceed 3d. per ton for coal supplied to railway companies. This is an advantage of 3d. over national factories, which are to pay 6d. per ton, and 6d. over gas and electricity undertakings, which are to pay 9d. per ton. Other coal will pay 1s.; while Ireland will pay 1s. 3d. a ton for "all coal."

Supplementary Conditions.

There are a number of conditions attached which will have to be studied. Among others, it will be seen that, no matter how many hands the coal passes through, they will only be allowed to divide the one fixed extra. Prices of current contracts become subject to the provisions of the Price of Coal Limitation Act and of this new Order; but there is provision for an appeal to the Coal Controller for relief. The Controller evidently does not intend to allow purchasers to go bargaining in a manner that will give them advantage. It will be noticed that it is decreed that "no person shall sell or buy, or offer to sell or buy, any coal at a price exceeding the maximum price hereby fixed;" and the Coal Controller is invested with all power to see that the Order is obeyed. Both buyers and sellers will therefore have to investigate present contracts to see that they come within the terms of this Order. The "Iron and Coal Trades Review" recently stated that the scale of prices was regarded as very unsatisfactory and unfair, seeing that it did not include office and other expenses, which were alone sufficient to absorb the smaller allowances in the majority of cases. Whether or not there is any legitimate ground for this assertion, the fact remains that further negotiation has not succeeded in altering the amounts. On the other hand, we understand that the coal factors are not displeased with their 9d. per ton from gas undertakings. Seeing that it stands where it does in the scale, we can well believe this to be true. We have known coal factors who have made a very respectable position in the world on much less than 9d. per ton on their gas coal contracts.

Commercial Intelligence Organization.

With the conviction that the demands upon the Government for the collection and diffusion of commercial intelligence for the benefit of the trade of the United Kingdom are like to be very much greater after the war than has been the case in the past, the Board of Trade and the Foreign Office have for some time past been maturing plans for developing and improving the official arrangements for commercial intelligence, so far as they fall within their scope. The result has been the issue, as a Parliamentary Paper, of a joint memorandum on the subject, setting forth a scheme which has been sanctioned by the War Cabinet. From this it appears that the Board of Trade have obtained the sanction of the Treasury for a large development of the Department of Commercial Intelligence, and for a wide expansion of the system of Trade Commissioners within the Empire. Further than this, the Foreign Office have elaborated schemes for strengthening and developing the Commercial Attaché and Consular Services, and for increasing their utility to British trade. Parliamentary control over the enlarged Commercial Intelligence Department which is to be created will be exercised through a new Parliamentary Secretary; and the Department will eventually comprise the existing Commercial Intelligence Branch of the Board of Trade and the Foreign Trade Department of the Foreign Office. Smooth working of this combined scheme should be fostered by the contemplated constant interchange of staff between the Department and the Foreign Office and the Board of Trade, so that all may be thoroughly acquainted with the work. Another point is that opportunity will be given to diplomats and consuls in training to serve for a period in the Department. A good

feature is that the Department will be assisted by an Advisory Committee of business men; and it is hoped that a Sub-Committee of this Committee may meet at frequent intervals to advise the Department on current work. It is believed that the scheme, by securing uniformity of policy in respect of overseas trade as a whole, will afford a satisfactory solution of a problem which has for some years past been drawn attention to by the commercial and industrial community.

OBITUARY.

Alderman LAZARUS HART, who died last Friday at the age of 86 years, had been a Director of the Isle of Thanet Gas Company (Margate) for thirty years, and for exactly half this time had acted as Chairman. During the whole of his chairmanship he had, until last month, missed only one attendance. Alderman Hart was also Chairman of the Broadstairs Gas Company, and of the Ash-next-Sandwich Gas Company, Ltd. For two succeeding years he was Mayor of Ramsgate, of which borough he was Senior Alderman and a Justice of the Peace. Through his long association with the industry, he had acquired an extensive knowledge of gas matters; and in this and other ways his loss will be much felt in the locality. The funeral took place on Sunday, amid manifestations of deep mourning. The deceased gentleman was cousin to Sir Philip Magnus.

PERSONAL.

The Doncaster Gas Committee have appointed Mr. D. T. LIVESEY, of Tunbridge Wells, as Assistant Gas Engineer, to succeed Mr. H. J. CARPENTER, who has accepted a position at Peterborough.

Mr. JOHN FLANNERY, of Nenagh (co. Tipperary), has been elected Manager of Nenagh Gas-Works, in succession to Mr. BYRON, who has left for the Isle of Man. There were thirty applicants for the position.

Mr. WALLACE SUGDEN has been appointed to fill the vacant position of Chemist to the Stretford Gas Company, applications for which were asked for by advertisement in the "JOURNAL." Mr. Sugden, who is at present engaged at the Bradford Road works of the Manchester Corporation, received his early training at the Stretford Gas-Works.

It is gratifying to learn that Captain G. W. BIDWELL, who joined-up nearly three years ago, and was wounded through the right lung in Gallipoli, is to all intents and purposes now quite fit again. After being in England for a year, he voluntarily joined a Labour group at the front, and has served at this work for over twelve months, within shell fire the whole time. The experience thus gained in the control of a very large body of men should stand him in good stead with the return of happier times.

In our issue for July 3 a report appeared to the effect that Lieut. J. W. BROWN, of the R.F.C., was dangerously ill with concussion of the brain, through the collapse of his aeroplane in mid-air while engaged in operations in East Africa. He lay unconscious for practically three days; and then, while in hospital, his physical condition was rendered worse by an attack of malaria. We are pleased to say Lieut. Brown arrived home last Sunday week, by hospital ship from Cape Town; and his friends in the gas profession will be glad to learn that he is now well on the high road to recovery.

At the Litchurch works of the Derby Gas Company, the Chief Foreman, Mr. T. MASON, has been presented with an illuminated address, a purse of money, and other gifts, on his retirement after serving 46 years with the Company. The Engineer and Manager (Mr. J. Ferguson Bell) presided, and was supported by the Resident Manager at Litchurch, Mr. R. Fisher. Dealing with Mr. Mason's long association with the Company, he emphasized the benefits likely to accrue to employers and employed from such a continuity of service, and expressed the hope that their friend would be long spared to enjoy his well-earned retirement. Mr. Fisher said that for 21 years he had worked with Mr. Mason, and had always found him an ideal foreman. The presentation was made by Mr. Longdon (the oldest employee).

The will has been proved of the late Mr. Walter Cliff, of Melbourne Hall, near York; the estate being valued at £504,746. Mr. Cliff was formerly a proprietor of the business of Messrs. Joseph Cliff & Sons, fire-brick makers, of Wortley. Probate has also been granted of the will of Mr. Cliff's elder brother, Mr. William D. Cliff, the value of whose estate amounts to £229,380, with net personalty £171,885.

There are published in the "American Gas Institute News" the subscriptions to the "Liberty Loan" in connection with the war of a number of gas companies and their employees. The figures are: Gas companies, $10,532,150; employees, $3,709,130; total, $14,241,280. This shows a proper spirit of patriotism; and it has to be remembered that the list is only a partial one. Many companies did not subscribe as companies; and in numerous instances the employees did not subscribe through the company, but through the banks.

INCREASED PRICE OF GAS IN BERLIN.

IN sending on the enclosed translation from the "Vossische Zeitung" announcing a decision to increase the price of gas in Berlin, our correspondent remarks that this may be of more interest now than their continued discussion of the "restrictions."

FROM THE "VOSSISCHE ZEITUNG" OF AUG. 26.

INCREASE OF THE GAS PRICE.

In consequence of the coal tax, the considerable increase in wages, and the higher prices of materials, the Berlin Gas-Works have to provide for an increased expenditure during 1917 of at least M. 10,000,000, while the increased receipts will scarcely exceed M. 2,600,000. The management has, therefore, decided to raise the price of gas from 16 pfg. [4s. 6d. per 1000 c.ft.] to 20 pfg. [5s. 8d. per 1000 c.ft.] per cubic metre, from the date of the meter-index taking in September; and, in the case of prepayment meter and other small gas consumers, using less than 365 c.m. per annum, to allow a reduction of 2 pfg. on this price—*i.e.*, to charge only 18 pfg. per cubic metre [5s. 1d. per 1000 c.ft.]. The discounts hitherto allowed, and the special discounts, &c., will be discontinued as from September. The former discounts due up to the end of September will be settled according to the annual consumption shown at the close of the year.

After full consideration, the magistrates of Berlin have approved of the decision of the managers. The Berlin Town Council will deal with the question of the increase in the price of gas at its first meeting immediately after the holidays.

The English Gas Company will likewise modify the price of gas; and from other towns we learn that discussions over increases in the price of gas are taking place, and that announcements in regard thereto may be expected shortly.

ORDER AS TO COAL TAR (CRUDE AND DEHYDRATED).

THE following order in respect of coal tar (crude and dehydrated) was issued last Tuesday:

The Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Acts, and of all other powers enabling him, hereby orders as follows:

(1) No person shall, as and from the 1st of October, 1917, until further notice, purchase, or offer to purchase, any coal tar (whether crude or dehydrated) except under, and in accordance with, the terms and conditions of a Licence issued by, or under the authority of, the Minister of Munitions. Provided that no Licence shall be required—

(*a*) By a tar distiller for the purchase of coal tar in any quantities, provided that the whole quantity purchased is intended to be, and is in fact, distilled by such distiller.

(*b*) By any person for the purchase of coal tar (whether crude or dehydrated) in quantities not exceeding 10 gallons, provided that the total quantity purchased by any one person during any one calendar month does not exceed 50 gallons.

(2) No person shall, as from the 1st of October, 1917, until further notice, except under, and in accordance with, the terms and conditions of a Licence issued by, or under the authority of, the Minister of Munitions accept delivery of, or make payment for, any coal tar tendered for delivery under any contract existing at the date of this Order unless (*a*) such contract is in writing, and (*b*) full written particulars of such contract have been furnished to the Minister of Munitions before the 1st of October, 1917, by the person for the time being entitled to deliveries thereunder.

(3) For the purpose of this Order, the expression "Coal Tar" shall mean and include tar produced or derived from the destructive distillation of bituminous material by any means other than blast-furnaces.

ELECTRICITY SUPPLY MEMORANDA.

THE publication in the "Journal of the Institution of Electrical Engineers" of the street-lighting specification which emanated from the Joint Committee of various organizations supplies our electrical contemporaries with an opportunity for commenting upon the objections of the minority to the main feature of the specification. The minority is represented by the Institution of Gas Engineers; and the majority is constituted of representatives of the Institution of Electrical Engineers, the Illuminating Engineering Society (which has a larger electrical than gas element in its composition), and the Institution of Municipal and County Engineers, whose interest in this particular matter is partly dominated by the municipal ownership of electrical enterprises. Where there is not this ownership, gas lighting for street purposes very largely prevails; where there is this ownership, it is frequently found that gas lighting is in the streets a diminishing quantity. The criticisms of our contemporaries are directed mainly to the objection of the minority that the minimum horizontal illumination obtained is not for contract

Paying for External Boosting of Illumination.

purposes a correct method of assessing the illumination given by street-lamps, inasmuch as illumination is subject to such extraneous and adventitious circumstances as reflection from buildings, light from other sources, and so forth. Therefore hold the minority a more correct measurement for contract purposes is the average candle power of light sources ascertained at two or three specified angles. The gas minority will not abandon this point; the electrical majority will not give way on their contention, which involves the crediting of the lamps with any advantage secured by location, which would not be the true value of the lamp itself. We have never yet seen any proper defence of this electrical attitude; and our electrical contemporaries do not advance one. The whole question resolves itself into this: Is what the purchasers contract for the illumination given by the lamp *per se*, or the illumination given by it *plus* the kind assistance of its environment. Move a lamp from one place to another, and, under the electrical device for taking into account all the scraps of contribution to the minimum illumination, the lamp will give a different value in the two positions.

A Fraudulent Method.

The "Electrician," in an editorial article, gives the whole electrical game away, and tries to entice the gas people from the path of virtue by a very lame argument. It says: "Reflection from the walls of buildings can scarcely be taken as a serious objection, as such reflection would merely be to the advantage of the lamps supplying the illumination, and would render *it more easy to comply with the minimum*. We cannot therefore consider this particular objection is one that can be well supported." "Would render it more easy to comply with the required minimum!" That is to say, though the minimum illumination from the lamp unaided is below the minimum contracted for, any lucky external aid to boosting-up the illumination so that it can comply with the assessing test is something that should be thankfully received by the seller, and be paid for by the purchaser. The "Electrician" does not intend that there shall be any misunderstanding as to its meaning; for, in mentioning that the Institution of Gas Engineers consider that the correct measurement for contract purposes is one based on the average candle power of light sources as ascertained at two or three defined angles, it says "with this view we disagree, for the simple reason that what is required is not candle power, but illumination." Illumination whence? From the lamp *plus* the accidental contributions of external sources or reflecting surfaces? After arguing in favour of the electrical majority view, our contemporary proceeds to present another point, which is distinctly against itself and the electrical majority. A specification for street lighting can be no good that does not provide a means of measurement of what should be paid for, which is the independent value of the light from the lamp itself, and not a value that is vitiated by something external to itself. Therefore, our contemporary does no good to the point of view of the electrical majority when it writes: "We think that one of the causes underlying the opposition to these standard clauses is that they may be regarded as a basis for penalties. Obviously, if penalties are to be exacted, the accuracy of measurement must be not only sufficient to act as a guide, but sufficient to ensure that no injustice is done. . . . It will be generally felt that the accuracy of illumination measurements does not compare with the accuracy of efficiency tests in electrical work; and, therefore, contractors may object to such measurements for the purpose of exacting penalties. On the other hand, unless penalties can be based upon specified measurements, it is difficult to see how the specification can be regarded as one that is 'standard,' and one which carries with it various legal obligations." We agree; and for the reason so well expressed by our contemporary as to the attitude of the minority. It also draws attention to another piece of looseness in the specification, to the effect that the illumination may be measured by (*a*) any suitable illumination photometer, and (*b*) by any suitable photometer measuring candle power, from which the illumination may then be calculated. The two means of measurement would not according to location give comparable results; and therefore there should not be choice in the selection of the means. If the "Electrician" were to ask its electrical friends which method they would adopt, we can see the wink and the smile that would accompany the answer in favour of "*a*," and of the auxiliary credits that local circumstances were kind enough to throw in. Of course, this "would merely be to the advantage of the lamps supplying the illumination, and would render it more easy to comply with the required minimum;" and therefore our contemporary cannot "consider that this particular objection is one that can be well supported." Perhaps it will be good enough to read its own article again.

The "Horrible Compound" and Munition Works Kitchens.

The Kaiser sets a very bad example to his enemies. When they happen to do anything that does not meet with his high barbaric ideals as to what constitutes legitimate warfare, he employs harsh language, which, however, does no harm. The "Electrical Times" writer of "Cooking and Heating Notes" is falling into this vicious habit. He says it is claimed by the gas people that the "horrible compound" they dispense is used as a matter of course to heat the cooking apparatus in kitchens attached to munition works. The sentence betrays a certain amount of anger; and it is not chivalrous. If we spoke of electricity as that "sneaky" current, or as the "invisible foe" that weekly sends men into the great unknown without warning, or without giving them an opportunity of escape by the use of any one of their senses, and that sets up conflagrations without even providing a preliminary cautionary smell, "Meteor" or someone else would be sure to fall upon us as though we had committed some unpardonable crime. But about the "horrible compound" that Nature has provided for the convenience of mankind, and which gives to the said mankind a heating agent rich in thermal value, and a few other things besides of remarkable use. Had it not been for this so-called "horrible compound," we are not sure whether there would have been an "Electrical Times" in existence now within which the little piece of puerile spite could have been printed and circulated. Certain it is the Central Powers would have had the conquest over us that the All Mightiest amiably designed. But what is the "horrible compound"? The writer of "Cooking and Heating Notes" would probably have to consult a text-book before he could reply, and then he would find that Nature had had no need to consult him in compounding gas in a manner to give it a very large utilitarian character for the purposes for which it is employed, for which purposes it has made a progress of no mean proportions, and with the more modern appliances will work a greater way still. The petty assaults of peevish writers and the 3420 B.Th.U. electrical unit (which requires so great a number of other B.Th.U. to give it birth) will do little to put the brake on to that progress. But the descriptive term is attached to a reference to cooking in munition works; and the writer asserts something that, if he is cognizant of the facts, he must know is a deliberate falsehood. He says the truth is that "electricity is adopted for cooking purposes in practically every case." It is a pity that he was not at Mr. H. M. Thornton's lecture at the Royal Society of Arts last April; for then, after seeing the series of photographic illustrations of munition works kitchens that was thrown on the screen, he would never have penned such a piece of absurdity. If he had seen the output of plant for munitions works from the works of all the gas-stove makers, or if he could inspect their books showing what they have been doing in this way, he would never have written a sentence that has ignorance and foolishness impressed upon every word of which it is constructed. A slight indication of what has been done can be seen by glancing through the volumes of the "JOURNAL" for the past two years.

The One and Only Argument.

The same writer has something to say on "economy;" but he cannot get further than that beautifully stale fable regarding the "saving" of "meat" by electric cooking. The other phases of the subject are not worth notice—electrically speaking. In these war times we read, "economy is the watchword for the household; and the electric-cooker offers the best means for securing it." We have got into some awfully expensive muddles in this war through trusting to armchair politicians; and, even in the minor affairs of life, people are rather keen just now against being landed into any additional burdens through similar cause. Our electrical friend thinks that an "excellent opportunity now exists for station engineers to develop the sales of electric-cookers by impressing upon their consumers the savings that can be effected by electrifying their kitchens." Wit is part of the stock-in-trade of one of the members of the staff of our contemporary; but we hardly think he has anything to do with this particular section of the paper. In normal times, an electrical outfit for kitchen purposes is an expensive matter; in war times, much more so. Glancing through the news items of the electrical papers, we see frequent mention of cooking and heating prices now up to 2d. and more per unit. Truly, "an excellent opportunity for station engineers to develop the sales of electric-cookers." Station engineers know much better. Then we come to the kernel of the thing; and this is where economy is to be found—the discounts supplied by high installation costs and prices for current obviously being, in the view of this writer, negligible quantities. It is the inevitable *dernier ressort* of the electric cooking advocate. Here it is: "It has been proved beyond all question that the loss in weight of meat when cooked in an electric-oven is small compared with the waste that takes place with gas or coal cooking." That is to say, no matter how careless a person is with the electric-cooker, it is impossible to waste meat. If a high temperature is employed in an electric-cooker, and a low temperature in a gas-cooker, still the electric-cooker, with good conscience and intention, absolutely refuses to waste so much meat as the gas-range. That is the meaning of the fable, if it has any meaning at all. The electric-cooker cannot err; it declines to waste meat. If a 7½-lb. joint is purchased from the butcher, the electric-cooker will decline to put anything less than a 7-lb. cooked joint on the dinner table. It is very kind and very thoughtful of the electric-cooker. But will our friend answer the question we have put to him, or, if not to him, to others who have promulgated the same nonsense. Why is it, if equal temperatures are employed in electric and gas ovens, it is necessary to put a 9 to 10 lb. joint in a gas-oven and only a 7½-lb. one in an electric-oven to get 7 lbs. placed on the dining-table? We should like him to explain that; and, in doing so, we shall be obliged to him if he will not run off and hide behind the subterfuge that we have before experienced at the hands of electric cooking advocates. We have plenty of evidence as to the use of electric-cookers, as to their supersession by gas-cookers, and as to the thankfulness of users that they have got rid of a dilatory untrustworthy nuisance from their kitchens.

AN IMPROVED FLEXIBLE GAS-CONTAINER FOR VEHICLES.

A few weeks ago there was reproduced in the "JOURNAL" a photograph sent by Mr. Philip G. G. Moon, the Acting General Manager of the Bournemouth Gas and Water Company, of two of their motor-lorries which have been converted to the use of coal gas instead of petrol. Writing again on the subject, Mr. Moon remarks that, while these have been running fairly successfully, there are certain drawbacks attaching to the unwieldy floating gas-container—especially when this is partly deflated. Added to this, the bags the Company have been using are slightly porous, and there has been a considerable escape of gas, which not only results in loss, but is found to also cause a somewhat disagreeable smell as the lorry passes through the streets.

In fitting-up the third lorry, therefore, steps were taken which have been successful in overcoming most of these drawbacks. The general effect of the arrangement will be gathered from the illustration. The tray at the top of the lorry has been made 16 in. deep, and is rendered gas-tight by two layers of canvas stuck over the whole of the interior surface, and painted with successive coats of paint and shellac. Over the top of this gas-tight tray a sheet of good-quality rubbered canvas, quite impervious to gas, has been fastened, by means of slats all round the top of the tray, and shaped in such a way that it rises to a height of 18 in. above the tray-top.

An important point mentioned by Mr. Moon is that the cost of the canvas for this lorry was only about two-fifths as much as would have had to be spent upon a complete bag of similar capacity. On the other hand, the tray, of course, costs slightly more than the old shallow tray. The whole arrangement is, Mr. Moon says, so much neater, safer, and more effective in working, that he thinks it is well worth the consideration of any who may be contemplating converting their petrol lorries to coal gas.

Writing in the current issue on the general subject of the use of coal gas for motors, the "Ironmonger" says:

Complaints have been made by users of town gas for melting metal of variations in quality from day to day; and those who use gas for propulsive purposes are likely to encounter the same trouble, aggravated by the fact that the quality will vary to an even greater extent from district to district. If the gas companies are to reap the full benefit from this development, some improvement must be effected in the regularity of the quality of gas supplied. The man with gas-fired furnaces cannot remove to another town by way of protest; but the motorist will be free to obtain his supplies where he gets the best value for his money. Owing to the varying local conditions under which gas is made, it will not be possible to make the same quality throughout the country; but some approximation to uniformity is distinctly possible, while day-to-day variations in the same district ought to be largely eliminated by efficient works management. The potential custom of the motorist is not to be lightly ignored by the gas companies. There is no reason why some hundreds of thousands of light and heavy delivery vans should not be running in our principal towns within the next few years, using gas from flexible containers at atmospheric pressure. All that is required is a little intelligent publicity by the gas companies, and the provision of sufficient filling stations at convenient distances.

9000 CUBIC FEET OF GAS PER TON OF COAL.

By NORTON H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

NOT the least remarkable feature of the effect of war time conditions on the gas industry is the fact that gas engineers have repeatedly been asked to reverse established practice by going back to methods of procedure that were generally supposed to have been improved out of existence. The Government Committees step in and demand preferential consideration, and their requests from time to time are so conflicting (not to say contradictory) that one is under some perplexity as to the best course; and the well-known fable entitled "Old Man, Son, and Ass" acquires some additional signification.

That the bulk of the tar, and certainly the heavier portions, should be removed from all contact with the gas at the highest practicable temperature before the cooling is complete—say, at 90° or 100° Fahr.—has for years been an established axiom in the profession; but we are now advised to wash the gas freely with tar (the colder the better) or to subject it to a yet more rigorous oil treatment. We have known for some time that the greatest heating value for a ton of coal carbonized synchronized with the largest yield per ton that was consistent with the requirements of the official gas examiner. This may not be scientific; but it is business, and has satisfied both consumers and shareholders. It has been suggested that we should put the clock back fifty years, by returning to lower carbonizing temperatures and a make of 9000 c.ft. per ton, in order to improve the yield of tar. If there ever was a time when a low yield was profitable, it was when coal was cheap, and not when it is costing 30s. or more per ton.

The importance of making a pure sulphate that will show a 25 p.ct. ammonia content on testing has been repeatedly advanced; but we are told to use an impure residue in place of good acid, and thereby reduce the ammonia content to about 18 p.ct. Under present conditions of the labour, coal, and materials markets, it is indispensable to reasonable prices and profits that the sales should be maintained; yet gas undertakings were asked last year to add to the duties of their already overworked and depleted staffs a house-to-house canvass for the purpose of inducing people to use less gas. In each case, these innovations owe their introduction to a definite requirement, which may be the one thing needful to the Government, but cannot be so regarded from the gas-works' point of view, because a radical change may carry with it a number of unforeseen developments, which may prove to be favourable, unfavourable, or even disastrous, in a general way. Gas engineers are not deaf to claims of a patriotic or national character, as proved by the work they have done during the last three years. But they are expected to carry on with due consideration to the requirements of customers, many of whom are directly or indirectly concerned with Government work, and to the solvency of the undertaking for which they are responsible.

Experience in the tar market since the outbreak of war is not encouraging to an increased output of this residual, nor was it so for some time before. The Government require coal, rail, and shipping transport, metals, all kinds of materials, and labour; and, as a general rule, the result is that prices of such necessaries go up to unheard-of figures. One of their requirements is a very large supply of coal-tar; and the man in the street naturally supposes that gas companies are receiving anything up to 500 p.ct. of the normal prices. He is not aware that this case has proved the exception, and that during the earlier period of the war the market was glutted. Not only did the price fall to a nominal figure, from which it has only just begun to show signs of recovery, but some gas-works could not get stocks kept down to a comfortable limit at any price. Before entering upon a substantial advance in make, the gas industry needs to be assured that the experience of 1914-15 will not be repeated. Something has been said about subsidies; but a better inducement is a reasonably fair price, consistent with that of other raw material. Why should the gas undertakings be expected to sell at normal rates at a time when they cannot obtain any of their requirements under 100 to 200 p.ct. advance?

Profiteering is not confined to sellers; it may also take the form of obtaining goods at compulsory low prices.

Similar arguments apply, but in an inverse degree, to the consequent larger drafts on the supply of coal and labour. Gas undertakings are at present unable to obtain anything like adequate supplies of coal at the prices fixed by Government—and this in the light season; so the outlook for the ensuing winter is not promising. The same may be said about labour. So gas engineers may well pause to consider their position in respect to both these indispensable requirements before launching out on new schemes that, in the absence of special assistance, must inevitably accentuate the existing difficulties. They also want to know how the 9000 c.ft. quality will agree with the incandescent burner, even after most rigorous oil-washing. If turned direct on to a district accustomed to calorific standard gas, there will be complaints of sooted mantles and ceilings. One result of high-temperature carbonization is a reduction in the fuel account and a harder coke; and a return to old-time conditions will mean a reduction in the quantity of hard large coke available for sale. The deficiency must be covered by some other fuel, probably by coal.

These considerations are not advanced in a spirit of carping criticism, but as matters to which the gas engineer is expected to provide a satisfactory answer; and a little light may be thrown on the subject by a consideration of some results recorded by Mr. Lewis T. Wright, in a communication to the Society of Chemical Industry in 1888, and by the late Prof. Vivian B. Lewes, in his Cantor Lectures delivered in 1908.

TABLE I.—*Composition of Tars Obtained at Different Temperatures.*

Reference No.	I.	II.	III.	IV.	V.
Make of gas per ton	6,600	7,200	8,900	10,162	11,700
Tar, sp. gr.	1·086	1·102	1·140	1·154	1·206
Per Cent. by Weight.					
Ammoniacal liquor	1·20	1·03	1·04	1·05	0·38
Crude naphtha	9·17	9·05	3·73	3·45	0·91
Light oil	10·50	7·46	4·47	2·59	0·57
Creosote oil	26·45	25·83	27·29	27·33	19·44
Anthracene oil	20·32	15·57	18·13	13·77	12·28
Pitch	28·89	36·80	41·80	47·67	64·08
Fixed carbon	8·69	11·92	13·53	—	24·67
Ammonia, lbs. per ton	—	6·30	7·50	7 89	7·41
Per Cent. by Volume.					
Naphtha . . . Total	10·96	10·73	4·59	4·27	1·31
Below 100°	0·85	1·15	1·00	0·75	0·38
,, 120°	0·82	0·97	1·10	0·79	0·54
,, 140°	2·52	2·01	0·89	0·90	0·27
,, 170°	3·10	2·74	1·02	0·86	0·24
Paraffins in	5·00	4·00	1·50	1·00	1·00
Tar acids	13	9	8	9	6
Light oils	11·70	8·41	5·23	3·01	0·69
Below 160°	0·41	0·21	0·14	0·11	0 14
,, 180°	1·76	1·14	1·36	0·58	0·15
Tar acids	34	34	29	31	22
Estimated Comparative Weight per Cent.—per Ton of Coal.					
Ammoniacal liquor	·168	·134	·125	·115	·038
Crude naphtha	1·284	1·176	·448	·380	·091
Light oil	1·470	·970	·536	·285	·057
Creosote oil	3·703	3·358	3·275	3·006	1·944
Anthracene oil	2·845	2·024	2·175	1·515	1·228
Pitch	4·044	4·784	5·016	5·244	6·408
Loss	·486	·554	·425	·455	·234
	14·000	13·000	12·000	11·000	10·000

The figures shown in Table I. are abstracted from the official report of Mr. Wright's paper, which states that a fair quality gas coal was carbonized at five different temperatures, in a bed of seven through retorts, calculated to work off a charge of 2 cwt. per 9 ft. length in from five to eight hours. The retorts were 18 in. × 16 in. section, 18 ft. long; so it is evident that, according to modern notions, the charge was a light one, and therefore that the figures obtained in 1888 cannot be compared on all-fours with results recorded in 1917. The tests were made before the pusher mechanical charger and discharger had rendered the full retort a practical possibility. But this does affect their comparative value, one against the other. Assuming that the retorts were Ω section, the section area would be about 1¾ c.ft., and the cubical content of the empty retort 31½ c.ft. On the usual basis of 42 c.ft. per ton, the content of the charge would be 8·4 c.ft., or 26·6 p.ct., leaving 73·4 p.ct. of it unoccupied by the cold charge. But under the influence of heat, this would rapidly swell at least 50 p.ct.—say, to 13 c.ft., or 41·5 p.ct.—leaving a clear space above it of 18¼ c.ft. The interstices in the cold charge would be soon filled by intumescence, and the gas would escape in quick puffs, without important contact with the red-hot charge. As compared with modern conditions, there would be shorter time contact with the coke, but a prolonged exposure to radiant and contact heat before reaching the ascension pipe. Assuming an outlet at each end, the average length of travel in the clear space would be 4½ c.ft.; and as at the makes stated the average evolution would be within the limits of 82½ and 234 c.ft. per hour, the average period of exposure would be one to three minutes. The maximum exposure time at the minimum temperature is less effective, so far as secondary reactions are concerned, than a minimum time at the maximum; showing that such actions depend more upon temperature than upon time. The conditions vary in all respects—travel, exposure, and temperature; and when we talk of a "high" or a "low" carbonizing temperature, it should be remembered that a large portion from the parts adjacent to the outlet, and during the earlier hours of the charge, before it has attained a maximum temperature, escape at a much lower heat. The total product, therefore, cannot be said to represent that at the maximum temperature, being mixed with low temperature substances. These probably constitute the heavier portions of the tar.

From Table I. the effect of varying temperatures on the composition of the tars may be summarized as follows: As the distillation temperature advances, the tar becomes heavier, due to the replacement of lighter constituents with fixed carbon and pitch, and a corresponding reduction in crude naphtha, light, and creosote oil. The make of creosote oil increases up to No. 4, but shows a sudden drop in No. 5. And this, together with other sudden changes, such as the increase of pitch on No. 5, as compared with No. 4, affords clear evidence of the existence of definite phases of secondary reactions at certain temperatures. Since they are attended with separation of carbon, the proportion present is some indication of the extent to which such actions have obtained.

From the writer's point of view, it is unfortunate that Mr. Wright does not refer to the make of gas or of tar per ton. Obviously, with a varying make, the percentage composition does not indicate the actual production per ton, which is the practical consideration. By taking an approximate estimate—say, in the proportion of 14, 13, 12, 11, and 10—we get a better idea of the total production [see the estimated comparative weight, as added to Table I.].

Some extracts from the results quoted by Prof. Lewes form the first eight lines of Table II., and the remainder is based thereon. To get a complete statement of the composition of the gas, it is necessary to add an estimated content of 6 p.ct. of carbon monoxide, and the balance is assumed to be incombustible matter. The symmetrical sequence of the figures indicates that they are approximate averages, based on a number of actual tests. The yields of tar quoted show a wider variation than is usual in practice. Small gas-works running without an exhauster do not sell 15 gallons of tar per ton of coal carbonized, and the production accompanying a make of 11,000 c.ft. or more usually exceeds 9 gallons.

The effects of increase in the distillation temperature on the composition of the gas are:

I.—A substantial and steady increase in the hydrogen.

II.—A similar decrease, but somewhat less in amount, of the methane.

III.—A steady decrease in the unsaturated hydrocarbons.

As reference to carbon monoxide is omitted, it may be concluded that the proportion of this compound is not affected to an important extent. All these have a marked effect on the heating value, the air requirement for complete combustion, and the total B.Th.U. per ton of coal carbonized—the steady advance in the last-named being particularly interesting, in these times when economy of heat is so prominent.

The prospects of reducing the composition of No. IX. to a passable resemblance of No. II. are not promising, keeping in view the desired increased production of tar; and the loss and expense incidental to such a process would scarcely be covered by the larger quantity and improved quality. By passing No. IX. through a superheater similar to that used in the water-gas process, and maintained at a temperature of 1652°, such a result might be secured; but it would mean increased consumption of fuel. The same applies to the dilution of a 621 B.Th.U. gas to 552 B.Th.U., by means of blue gas of 300 B.Th.U. About one-fourth of the diluent would be required, ing the total product per ton up to 11,250 c.ft. bring

TABLE II.—*Composition of Gas at Different Distillation Temperatures.*

Reference No.	VI.	VII.	VIII.	IX.	X.	XI.
Temp. deg. Fahr.	752	932	1112	1292	1472	1652
C.ft. of gas per ton	5000	6400	7750	9000	10,000	11,000
Gallons of tar ,,	23	21	18	15	12	9
Sp. gr. of tar	1·060	1·087	1·115	1·140	1·170	1·200
Hydrogen	21·2	28·3	33·8	41·6	48·2	54·5
Methane	60·1	56·2	50·7	45·0	39·1	34·2
Heavy hydrocarbons	6·3	5·8	5·0	4·4	3·8	3·5
Carbon monoxide	6·0	6·0	6·0	6·0	6·0	6·0
Difference	6·4	3·7	4·5	3·0	2·9	1·8
	100·0	100·0	100·0	100·0	100·0	100·0
B.Th.U. per c.ft.	714	696	656	621	582	552
Air requirement	8·04	7·62	7·02	6·52	6·04	5·68

Total B.Th.U. per Ton of Coal.

No. VI.	35,713,950	No. VIII.	55,930,140
No. VII.	44,566,848	No. IX.	58,188,900
No. VIII.	50,830,467	No. X.	60,072,090

There would be a small increase on the total yield of gas, but an increased fuel account. A comparison of the heating value and air requirement of each constituent affords useful information, as shown by Table III.

TABLE III.—*Calorific Values.*

—	VI.	VII.	VIII.	IX.	X.	XI.
Hydrogen . .	6805·2	9084·3	10849·8	13353·6	15472·2	17494·5
Methane . .	61121·7	57155·4	51561·9	45765·0	39764·7	34781·4
Heavy hydrocarbons . .	1575·0	1450·0	1250·0	1100·0	1026·0	980·0
Carbon monoxide . .	1926·0	1926·0	1926·0	1926·0	1926·0	1926·0
Per cubic foot. .	714·279	696·157	655·877	621·446	581·889	551·819

Air Requirement per Cubic Foot.

Hydrogen . . .	50·46	67·35	80·44	99·01	114·70	129·71
Methane	582·15	535·03	482·67	428·40	372·23	325·58
Heavy hydrocarbons	157·50	145·00	125·00	110·00	102·60	98·00
Carbon monoxide .	14·28	14 28	14·28	14·28	14·28	14·28
Total	8·0439	7·616	7·023	6·517	6·038	5·676

The steady decrease in air requirement corresponds with the reduction in methane, which in No. VI. accounts for no less than 85 p.ct. of the total, and the minimum requirement, in No. XI. is over 60 p.ct. The heavy hydrocarbons have also a marked effect on the total, as compared with their small percentage proportion. This is due to their extensive oxygen requirements. Their calorific value, in all cases, constitutes a considerable proportion of the total.

LOW-TEMPERATURE DISTILLATION OF INFERIOR COALS.

By T. F. WINMILL, B.A., B.Sc., Research Chemist of the Staveley Coal and Iron Company.

[**A Communication to the "Journal of the Society of Chemical Industry."**]

Accompanying the main coal seams in some parts of England are often found seams of inferior coal substances, which with different composition and in different districts receive different names—such as "Jacks," "Branch Coal," "Bastard Cannel." As the last name implies, these coals have often some resemblance to a cannel coal; but the resemblance is not very close. They are all distinguished by their high ash content, and the very voluminous nature of the ash, making them useless for ordinary fuel purposes. Jacks and black shale may leave 80 p.ct. of ash when burnt; while a very good sample of bastard cannel may leave only 10 p.ct. In some districts the bastard cannel is fairly uniform in composition over a wide area and contains generally from 20 to 30 p.ct. of ash. The associated carbonaceous matter is intermediate in composition between a "soft" coal and a cannel, as is shown by the following limiting analyses, calculated on a dry, ash-free basis:

	Per Cent.
Carbon	78·0 to 81·0
Hydrogen	5·7 ,, 6·0
Nitrogen	1·2 ,, 1·5
Sulphur	1·5 ,, 5·0
Oxygen	10·0 ,, 10·5

From these figures it is clear that the substance contains a large amount of potential energy, which is at present wasted. The carbonaceous portion is comparable in composition to that of a good coal; so that in effect every 100 tons of branch or bastard cannel coal contains as much heat value as 70 to 80 tons of high-grade coal. Experiments have, therefore, been made to see whether any portion of this potential energy can be rendered available in the form of oil fuel or other valuable products.

Of recent years much attention has been given to the destructive distillation of coal at low temperatures, and many accounts have been published of the results of such distillations. In general, it is claimed that very large yields of tar and ammonia are obtained by this method—much larger than those from coke-ovens or gas-retorts; and, further, that the tars on re-distillation yield useful oils of different grades, some sufficiently volatile to replace petrol as a motor spirit. Such a process seemed, therefore, admirably suited for extracting the greatest possible quantity of valuable products from the branch coal. As the sequel shows, expectations of a large yield of oils have not been realized; and no workable quantity of volatile oils corresponding to petrol was recovered, despite the fact that a cannel coal should, on the showing of previous publications, have been the most favourable substance to work with.

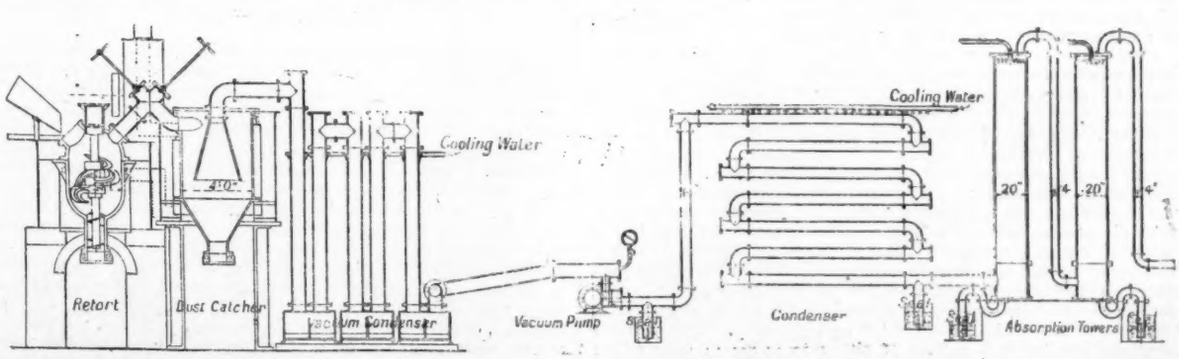
Apparatus.—In designing the apparatus for the distillation, it had to be borne in mind that the coke residuum would in any case be valueless, as its ash content would be above 50 p.ct. The aim of the design, therefore, had to be to secure the most rapid coking, with the biggest possible yield of bye-products, without considering the effect on the residuum. The retort was made of cast iron, 2 in. thick, built into a fire-brick chamber, and heated by five evenly-placed bunsen burners. It held a charge of 8 cwt. of coal, and was fitted with a very efficient stirrer that worked through a vacuum-tight stuffing-box. The stirrer quickly ground-up the charge, and brought fresh portions of it continually against the hot walls of the retort—thus securing a rapid heating throughout the mass, instead of depending on the slow conduction of heat usual in any other coking oven. The distillation was carried out under a vacuum of from 26 to 28 in. of mercury, and had gone as far as it would at 500° C. in 3½ hours, after which the contents of the retort could be discharged by opening the bottom door and reversing the direction of revolution of the stirrer.

While effecting such a marked shortening in the time of coking, the stirrer introduced experimental difficulties which at first gave much trouble. Part of the charge was, by the combined action of the stirrer and the effect of the temperature, quickly reduced to a fine dust, which was carried out of the retort—blocking the ascension pipes and the condensers. To reduce this to a minimum, the speed of the stirrer was reduced from three revolutions per minute to two revolutions in three minutes. But even at this speed the condensers soon became choked, until a dust-catcher and other appliances for dealing with the dust were introduced. An interesting, though very objectionable, property of the dust was its extreme liability to spontaneous combustion. A few pounds of it removed from the ascension pipe (even when absolutely cold) would, by the absorption of oxygen from the air and the consequent spontaneous generation of heat, burst into flame within about half-an-hour. The exclusion of oxygen from the dust, of course, prevents this firing.

The other details of the apparatus need no special remark, and are quite clear from the illustration drawn by Mr. F. Smith, for whose assistance in the arrangement, building, and working of the plant the writer wishes to tender his best thanks.

Method of Working.—The retort was brought to a temperature between 500° and 550° C.; the stirrer started; and a charge of 8 cwt. of coal introduced from a hopper. The retort-door was then closed, and the valve leading to the vacuum pump opened. The whole charging operations occupied less than five minutes. The vacuum and a temperature of 500° C. were maintained for 3½ hours, at the end of which time experience showed that practically no more oils or gases were being evolved. The vacuum valve was then closed, and air admitted to the retort through a ¼-in. pipe from the bottom of the charge. The bottom door of the retort was then opened; the direction of revolution of the stirrer reversed; and the carbonized residue discharged from the retort in the space of a few minutes. The collected tar was then run off from the condensers, after which the apparatus was ready for another charge. The complete series of operations, from the introduction of one charge to the introduction of the next, occupied slightly less than four hours; so that a plant of the size described would be capable of dealing with nearly 2½ tons of coal per day of twenty-four hours.

Distillation Products.—The distillation produced: (1) tar and



ARRANGEMENT OF THE COAL-DISTILLATION PLANT AT THE STAVELEY COAL AND IRON COMPANY'S OLD WORKS.

aqueous liquor condensed *in vacuo*; (2) gas which passes through the vacuum pump and was in part burnt under the retort.

Treatment of Tar.—The vacuum tar was quite fluid when warm; but on cooling it became as viscous as ordinary coke-oven tar. It has a characteristic and not unpleasant odour, quite unlike that of the latter. About 30 gallons was produced per ton of coal distilled. Its separation from the admixed water is very difficult; and nothing approaching a complete separation of the two could be obtained by "settling," or by reheating and settling.

On re-distillation, it undergoes decomposition even at temperatures as low as 150° C., depositing carbon and evolving hydrogen, sulphuretted hydrogen, and ammonia—the two latter gases probably coming from the admixed water, which in addition causes much frothing. Distillations were carried out both at ordinary pressure and under vacuum, but the products of the two distillations did not differ materially. The residue in the still consisted of a hard pitch which had to be chipped out. The distillate was a very dark-coloured oil containing suspended carbon, apparently formed partly by the thermal decomposition of the original tar and partly by oxidation of the cold oil. In this state, chemical treatment of the oil was difficult; and it was, therefore, subjected to further distillation, when it left as a residue a semi-solid mass containing much free carbon, and furnished a distillate which was at first colourless, quickly becoming red, and finally (within a day) black. This behaviour was not confined to any one fraction—all the distillates between 150° and 360° C. appearing to discolour with equal rapidity. The various fractions were then treated with 10 p.ct. caustic soda solution. All the fractions yielded a soluble portion, varying in amount. Thus, for example, the oil distilling up to 180° C. yielded 18 p.ct.; that between 200° and 220° C., 47 p.ct.; while that between 330° and 360° C. yielded only 21 p.ct. soluble in the soda solution. Of the whole distillate, 33 p.ct. was dissolved. The remaining 67 p.ct., on re-distillation, gave a colourless oil which soon blackened again. Treatment with successive portions of strong sulphuric acid finally gave an oil which, on distillation, remained colourless or only very slightly yellow.

The part of the oil soluble in caustic soda consisted of a complex mixture of phenolic substances, but contained practically no phenol (carbolic acid). The simplest phenols present were the three cresols, and these were mixed with higher homologues and phenolic ethers containing non-esterified hydroxyl groups. The whole mixture can only find very limited uses, similar to those of coal-tar creosote.

The fraction soluble in sulphuric acid consisted of a mixture of neutral phenolic ethers together with some hydrocarbons. The quantitative results per ton of coal distilled were:

Pitch	100 lbs.
Semi-solid wax	50 lbs.
Soda-soluble oil	4 gallons.
Phenolic ethers, extracted by sulphuric acid	1·5 gallons.
Hydrocarbon oil	6·5 gallons.

The finally purified hydrocarbon oil formed the main bulk of the liquid products. It consists of a mixture of unsaturated and polymethylene hydrocarbons, from which no chemical individual could be easily separated. The mixture has a characteristic and not unpleasant odour. It starts to boil at 150° C., and continues to distil in fractions of fairly equal volumes for equal temperature rises up to 360° C., above which point about 5 p.ct. of the total remains unvolatilized. The various fractions range in density from ·794 to ·910 at 15° C. No benzenoid hydrocarbons are present; and no commercially valuable compound can be isolated from the mixture. Even the higher boiling point oils are mobile liquids, and possess neither sufficient viscosity nor "body" for use as lubricants. The only obvious use for the mixture is as a fuel oil.

Ammonia Production.—The bulk of the ammonia formed was contained in the condensed aqueous liquor, and was equivalent to about 25 lbs. of ammonium sulphate per ton of coal. A further quantity of 10 to 15 lbs. can be extracted from the gas leaving the condensers, giving a total yield of 35 to 40 lbs. of ammonium sulphate per ton of coal.

Gas.—The gas coming from the condensers is very similar in composition to ordinary coal gas, and contains very little extractable light oil. Some oil is carried mechanically with the gas, but no appreciable quantity of oil boiling below 150° C. could be obtained, either by condensation or by washing. About 6000 c.ft. of gas was produced per ton of coal distilled.

Conclusions.—The experiments described show definitely that low-temperature distillation of a high-ash waste coal is not a commercially economical process. The initial low cost of the waste coal would, at first sight, seem to make it possible to work on comparatively small yields of bye-products. It must not be forgotten, however, that in ordinary coking practice the price obtained for the coke made, as a rule, more than pays for the slack from which it is made; and hence, in the absence of coke from the waste fuels, the apparent advantage of worthless coals more than disappears, and the whole costs of the process have to be defrayed by the increased value of the bye-products. In previously published accounts, the quantity and nature of these products claimed have been sufficient to pay for the process; but in the light of the experiments now described it would appear that these have been estimated much too optimistically. The saleable products amount to 6 gallons of oil, 35 to 40 lbs. of ammonium sulphate, and perhaps 2000 to 3000 c.ft. of gas, after allowing for that necessary for the distillation.

The value of the oil is difficult to estimate, as it is of a new type. It would seem to have little value except as a fuel oil, and for that purpose need not perhaps be so highly purified. Unless fairly complete purification is made, however, the oil will resinify and become of much less utility. The cost of complete purification is considerable. The phenolic substances which it is desired to remove are not very readily soluble in soda—being much weaker acids than carbolic acid; and hence it is the partition coefficient between the oil layer and the soda layer is so large that a considerable number of washings with comparatively large volumes of soda solution are necessary. In practice, it is found that a total volume of 10 p.ct. soda solution equal to the volume of the oil washed, is necessary for the complete removal of the phenolic bodies. The cost of these washings, added to that of the distillations, would make it impossible to produce the refined oil at a profit in normal times. As a fuel, however, the crude unwashed oil might find a market; but in this state it could only compete with coal tar creosotes, for which the uses are limited and the price low.

It was thought that possibly by cracking the oil, benzenoid compounds might be obtained in sufficient quantity to make the distillation profitable; but small-scale experiments, in which the oil vapours were passed over coke at 800° C., gave no encouragement for larger experiments.

It must be concluded, therefore, that low-temperature distillation cannot be made to pay on the value of the bye-products alone, and hence is useless as a means of utilizing waste fuels of high ash content. The process as applied to valuable coals is in a somewhat different position; for in this case a residue of "smokeless" fuel is obtained. At present, it cannot be claimed that there is any very large market for such fuel in competition with coal itself; but what market may be created in the future it is impossible to estimate. Any legislation in favour of smoke abatement would of course give a great impetus to the use of semi-carbonized fuels, since most boilers, and all domestic fireplaces, are not designed to burn ordinary coke, whereas the semi-carbonized fuels obtained by the low-temperature distillation of coal can often be burnt more or less successfully in existing apparatus. But they would then find a severe competitor in gas-firing. Unless such measures are taken, however, the ease with which a coal fire can be maintained, and the smaller proportion of ash in a good coal (for by carbonizing the proportion of ash in the residuum is made nearly double that in the coal from which it is produced), will severely handicap the extended use of smokeless fuel.

Welding Tool Steel on to Soft Steel by Gas.

Until recently, says Mr. Charles E. Richardson, of the Surface Combustion Company (N.Y.), writing in the "American Gas Engineering Journal," welding has been considered impossible in furnaces with town gas; but on careful investigation it was found that the causes of failure could be avoided. He describes a furnace which has been installed in connection with the production of machine knives for rotary cutters of wood-working and similar machines. The finished knives consist of a slab of soft steel, with a thin layer of tool steel welded on one face. The furnace is made up of two working chambers, with a pre-heating chamber between. The former chambers can be used separately or together; and the flue gases from them pass into the pre-heating chamber and out at the rear. The working chambers are maintained at a temperature of between 2700° and 2800° Fahr., which yields a temperature of approximately 1800° Fahr. in the pre-heating chamber. Surface combustion high-pressure burners and control devices are used. Often several re-heats are necessary to complete the welding and rolling to size; and because of this it is impossible to state definitely the efficiency of the furnace. It is, however, said that 1700 lbs. of work is handled in nine hours, on a consumption of 12,700 c.ft. of 580 B.Th.U. gas. Mr. Richardson remarks that these figures by no means represent the capacity of the furnace, but give an indication of the consumption of gas per ton of welded stock. It is possible to at least treble the tonnage shown by this test. It is felt that this installation, which has been in operation for several months, thoroughly demonstrates the availability of gas for welding work, and that a heretofore untouched field is now open to the gas industry.

Junior Institution of Engineers' Cadets.—The Junior Institution of Engineers have instituted a "Cadet Associate Membership," whereby engineering pupils in works or college (day or evening students) may be registered for a nominal yearly fee of 5s. It is open to youths of fifteen years and over who are still undergoing training, and who, as certified by a principal of a technical college or head of department of an engineering works, are making satisfactory progress in the development of their abilities as engineer-pupils. The registration as a cadet associate member of the Institution is for one year only; and renewals can only be accepted when satisfactory progress and development are vouched for by a responsible authority under whom the applicant is serving. The Institution undertake certain duties in regard to these cadets, which are set forth in a pamphlet that may be obtained upon application to the Secretary, at No. 39, Victoria Street, Westminster, S.W. 1. The project is commendable; and no doubt the scheme will be pushed with vigour and enthusiasm in the interests of the profession and of patriotism.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Glasgow, Friday, Sept. 7.

The Fifty-Sixth Annual General Meeting of the North British Association of Gas Managers was held on Friday, in the hall of the Philosophical Society, Bath Street, Glasgow. Mr. JOHN LANG, Gas Engineer, of Alexandria (the President), occupied the chair, and was supported by Mr. Alexander Masterton (Edinburgh), Mr. Robert Muir (Galston), the Vice-President, and Mr. P. B. Watson (Wishaw), the Secretary. Upwards of ninety members were present.

INTRODUCTORY.

The PRESIDENT, at the outset, expressed his pleasure at seeing such a representative attendance.

The minutes of the last annual general meeting were read and duly approved.

APOLOGIES FOR ABSENCE.

The SECRETARY submitted apologies for absence from Messrs. Doig Gibb (London), George Clark (Chesterfield), Alexander Yuill (Dundee), John Terrace (Grimsby), and George R. Hislop (Paisley).

COUNCIL'S ANNUAL REPORT.

The PRESIDENT said that copies of the Council's annual report had been distributed among the members. He had no doubt that the report had been carefully studied; he would merely formally move its adoption.

The Council, in their report, stated that the membership of the Association at June 30 was 251, as compared with 258 at the close of the previous year. There are 158 ordinary members, 10 associate members, 76 extraordinary members, and 7 honorary members. Intimation was made of the death of three ordinary members (Messrs. William Ewing, of Magherafelt, J. N. Myers, of Saltcoats, and William Smith, of Ayr), and two extraordinary members (Messrs. Archibald Mackay, of Edinburgh, and R. M. Sutherand, of Falkirk).

NEW MEMBERS.

The following were recommended for membership:

Ordinary Members.—Messrs. J. K. Simmons, of Moffat; James Kirk, of Auchterarder; W. Erskine, of Biggar; R. B. Waddell, of Polmont; T. M'Dougall, of Banff; A. Mackie, of Alva; A. Currie, of Campbeltown; W. Dunlop, of Cardenden; G. P. Wilson, of Banchory; and Jas. Dickson, of Kirkintilloch.

Extraordinary Members.—Messrs. F. Ellison, of Cleckheaton; A. Young, of Edinburgh; J. H. Bennet, of Edinburgh; Kenneth Aird, of Falkirk; F. J. West, of Manchester; J. G. Galloway, of Leith; and J. Brown, of Falkirk.

Transferred from Associate to Ordinary Membership.—Messrs. T. Carmichael, of Nottingham, and G. Braidwood, of Coatbridge.

Mr. John Lang, of Alexandria, has been appointed to represent the Association on the Council of the Institution of Gas Engineers for the year 1917-1918.

COMMERCIAL SECTIONS.

(1) *Western District.*—The meetings of the Western District throughout the year have been characterized by great vigour; and the usefulness of the section to the members has never been more pronounced. Despite the many difficulties brought about by the continuance of the war, and perhaps because of these difficulties, the attendances at the meetings were exceptionally good. The subjects discussed ranged over a wide field, interesting and informative to the members. The number of members is 47, the same as last year. During the year, Mr. James Bell, on being appointed Gas Engineer to the Town Council of Dumbarton, resigned the Honorary Secretaryship of the Association. The resignation was accepted with regret; and the members' appreciation of the very valuable services rendered to the section by Mr. Bell was recorded in the minutes. Mr. F. W. Carlow, of Renton, presided over the meetings, with much acceptance to the members (David Fulton, *Hon. Secretary and Treasurer*).

(2) *North Eastern District.*—During the past year there have been six meetings. The new orders by the Coal Controller, restricting the area of supply of coal, is causing a great deal of anxiety to many gas managers; and strong efforts will have to be made in order that a continuance of the present arrangements may be obtained. This is a matter which might well be taken up by the Association, also the question of sulphuric acid and sulphate of ammonia, seeing that the whole gas industry is affected (R. S. Johnstone, *Secretary*).

BENEVOLENT FUND.

During the financial year no applications for assistance from the fund were received. The amount at the credit of the fund is £773 19s.

NATIONAL GAS-TESTING LABORATORY FOR SCOTLAND.

The Council desire to report that, after making careful inquiry of qualified chemists in Glasgow and Edinburgh, and submitting to each of them a schedule of materials used in gas-works, and of which analysis may be required, the Council unanimously recommend that Mr. G. H. Gemmel, of No. 4, Lindsay Place, George IV. Bridge, Edinburgh, be appointed Official Analyst to the North British Association of Gas Managers for the ensuing year, with a retaining fee of ten guineas; this sum to be paid from the Research Fund of the Association. A printed schedule of costs of analysis will be posted to each member in charge of gas-works.

Mr. LAURENCE HISLOP (Uddingston) seconded the motion.

Mr. J. D. KEILLOR (Hawick) said it was surprising that there should have been a rather conspicuous omission from the report. This was the movement on foot for the reconstruction and development of the country's industrial organizations. Since the report exhibited no interest on the part of the Council in this matter, he desired to know what the attitude of the Council really was.

The PRESIDENT observed that the proposal for the formation of a Scottish Gas Council was a subject which would fall to be discussed that day. He presumed that it was a question of this kind relating to the gas industry that Mr. Keillor was referring to.

Mr. KEILLOR explained that he was not referring particularly to movements which applied to Scotland alone. He had in his mind such movements as were intended to reconstruct and reorganize the gas industry generally. Was he right in assuming that the matters mentioned in the *agenda* as coming before them for discussion that day embraced to the fullest extent the Council's interest on industrial reconstruction?

The PRESIDENT pointed out that the proposal for the establishment of a Scottish Gas Council had been discussed by the Council of the Association; and it was placed on the *agenda* solely with the object of giving the members an opportunity of expressing their opinions. It would be observed from the report that reference was made to the establishment of a national gas-testing laboratory for Scotland. The Council had recommended the appointment of Mr. G. H. Gemmel, of No. 4, Lindsay Place, George IV. Bridge, Edinburgh, as Analyst to the Association. Their belief was that the step they were taking would be justified by experience; and he hoped the members would take the fullest advantage of the facilities which had been provided for them. Mr. Gemmel had prepared, for the information of the members, a statement setting forth the principal materials used and produced in gas-works—of which analyses might at any time be required—and accompanying the statement was a note of the fees which would be charged. Since Mr. Gemmel was present, the meeting might wish to hear a few remarks from him.

Mr. G. H. GEMMEL (who was cordially received) remarked that the Association, in proposing to appoint an Official Chemist, was taking a very important step. If the idea was carried through, he had no hesitation in saying that the results would in every way justify the experiment. Nowadays every manufacturer ought to know the composition and strength of the materials he bought and sold. They could not afford to purchase material on the terms stated; they must be able to specifically check the guarantee given. They were quite well aware that, in selling sulphate of ammonia, it was possible for them to secure a higher price if they were in a position to improve the strength. It was only, then, by a comparison of results from time to time that they could improve the strength of sulphate of ammonia. Many of the materials they had to deal with in gas-works were well known, and, if he might use the term, standardized. In the case of fire-bricks, they knew generally the nature of their composition; and on this account, analysis was not quite so necessary there. The same applied to coals which were in common use. It was only when new seams were opened-out, and new qualities of coal put on the market, that analysis was desirable to test their suitability for gas-works. On the other hand, there were materials—such as lubricating oils, paints, cements, &c.—on which a close eye should at all times be kept. Further, the mere fact that members of the Association were testing and analyzing the materials supplied to them was sufficient to guarantee to a considerable extent that what was ordered would be supplied. The other day, the Secretary of one of the railway companies in Scotland, for whom he had done work for a number of years, said he was quite satisfied that the fee they paid was money well expended. It ensured that the oils, paints, white lead, &c., supplied were fully up to the standard contracted for. His (the speaker's) business was principally that of an analytical chemist and not a manufacturing chemist. Generally speaking, he had a practical knowledge of gas manufacture; and because of his connection with many other industries, he might be said to bring to his work a wider outlook than was possible only for the specialist in gas chemistry. Many problems lay in front of the gas industry; and if they agreed to his appointment as Official Analyst, he would endeavour to assist them in their many difficulties so far as his experience and judgment permitted him.

A vote of thanks was passed to Mr. Gemmel for his attendance and remarks.

The report of the Council was agreed to.

THE NEW SUBSCRIPTION RATES.

The PRESIDENT said that, in accordance with a recommendation of the Council, he was now prepared to move:

> That the members' annual subscriptions be increased as follows: (1) That all extraordinary members and members in gas-works making 20 million c.ft. per annum and upwards should be increased by 5s. per annum; (2) that all associate members and ordinary members in gas-works making under 20 million c.ft. per annum should be increased by 2s. 6d. per annum.

Speaking in support of the resolution, he said it would be noticed, from a perusal of the accounts, that the expenses for printing and stationery had risen considerably during the past few years. As a matter of fact, their costs in that connection last year were in excess of the preceding year to the extent of £25. Indeed, had it not been for the large number of extraordinary members they were successful in adding last year, they would have found themselves in a very bad way. It was anticipated that the increase in the subscriptions now asked for would bring in an additional sum of £50; and this amount it was hoped would cover the extra outlay. There was no sign of the war finishing; and they did not know to what extent costs would still

rise. The Council had delayed taking this step as long as they possibly could. The increase in the subscriptions was necessary; and he hoped the members would see the reasonableness of the proposal that was now put forward.

Mr. W. WILLIAMSON (Forres) said he believed he drew the attention of the members to the financial position of the Association at the meeting in Edinburgh a year ago. At that meeting the then President (Mr. Alex. Masterton) regarded the accounts as quite satisfactory. The truth of the matter was that the Council ought to have looked into this question of the finances six years ago. In 1910, the Association received a sum of £95 as subsriptions from extraordinary members. This sum had been entirely absorbed in meeting current expenditure. When the constitution was changed, it was thought that the Association might be able to keep solvent as a result of the subscriptions that were received from extraordinary members. Unfortunately, they still continued to find themselves on the wrong side, notwithstanding the fact that in the interval there had been received as subscriptions from extraordinary members something like £200. As an amendment to the proposal of the Council, he was prepared to move that the following increase in the subscriptions should be agreed to:

> 2s. 6d. for members and associate members in works making up to 10 million c.ft. per annum; 5s. in works manufacturing from 10 to 20 millions per annum; and 7s. 6d. in works of 20 to 40 millions per annum; and 10s. in works where the manufacture of gas exceeded 40 millions per annum.

He was not disposed to ask the extraordinary members to pay anything more than they presently did to the funds of the Association; but he held to the view that the subscriptions received from such members ought to be paid into the benevolent fund. This money ought not to be placed to the credit of the general fund at all, because it consisted of extraordinary, and not ordinary, subscriptions.

Mr. DAVID VASS (Perth), while seconding the motion made by the President on behalf of the Council, conceded that there might be something in the arguments put forward by Mr. Williamson.

Mr. D. ROBERTSON (Dunoon) expressed the view that the members ought to be very cautious before taking the course it was contemplated in increasing the subscriptions. It was to be borne in mind that they were living in extraordinary times; and it would be rather a pity if they should increase the subscriptions and find, before long, that the income was much in excess of the actual requirements. A great part of the increased expenditure could be traced to the additional charges for printing and stationery. But the present was a somewhat exceptional period; and it was never expected that the prevailing high rates for printing and stationery would continue after the war. In the circumstances, he thought that they should try and keep things going for another year or so without making the increases that were proposed. He was prepared to move an amendment to this effect.

The PRESIDENT said that, arising out of the observations made by Mr. Robertson, he might explain that the Council had seriously considered the financial position of the Association for the past three years. They had always been averse to making the change; but now it was forced upon them. They never anticipated that the war would last so long as it had done. It had come to be generally recognized now that, even after the war was over, a year or two must elapse ere prices could return to the normal.

Mr. J. M'DONALD (Denny) seconded Mr. Robertson's amendment; and there being no seconder for the amendment suggested by Mr. Williamson, it dropped.

On a division, the recommendation of the Council was carried by a very large majority.

AID IN EXPLOSIVES PRODUCTION.

The SECRETARY read the following letter which had been received from Lord Moulton:

> *Ministry of Munitions of War,*
> *Department of Explosives Supply,*
> *Storey's Gate, Westminster, S.W.,*
> *Sept. 5, 1917.*
>
> Dear Sir,—I am directed by Lord Moulton to acknowledge your letter of Aug. 23. His Lordship sends his best wishes to the North British Association of Gas Managers, and trusts that their annual meeting will be a great success.
>
> The gas industries of the country have rendered such inestimable service to this Department in providing the raw materials for explosives, that he feels very grateful to them; and if the needs of the country get greater or differ in this respect, he will come to them in confidence for their aid in future.—Yours faithfully,
>
> J. BAZIRE.

On the suggestion of Mr. LAURENCE HISLOP, the Secretary was instructed to acknowledge the courteous letter from Lord Moulton, and to assure him that the members would do what they possibly could to assist him in his work.

APPEAL FROM THE MINISTRY OF MUNITIONS.

It was intimated that a letter had been received from Mr. W. T. Dunn, the Secretary of the Institution of Gas Engineers, drawing attention to the recent announcement issued by the Ministry of Munitions requesting all gas undertakings to carbonize as much coal as possible, in order that the maximum yield of the products needed in the prosecution of the war might be adequately supplied. The letter explained that the Institution had undertaken to communicate with the District Associations, asking each of them to bring this important announcement under the notice of members. The hope was expressed that each undertaking would respond in the same patriotic spirit as had been shown in answer to other calls on the gas industry.

Mr. DAVID VASS (Perth) felt sure they were all at one in their endeavour to increase the output of gas; but the drawback appeared to lie in the fact that certain of the Government Departments were rather hindering them in their work in this connection. The difficulty he specially referred to was that associated with the granting of permits for materials.

It seemed to him as if this was a difficulty which was going to be aggravated in the future. If, then, the North British Association gave expression to its willingness to increase and accelerate the output as much as possible, it was natural to expect corresponding assistance and support from the Government Departments in the carrying on of the work.

The PRESIDENT remarked that they were all agreed in the expression of opinion given by Mr. Vass. The trouble was that things at the present moment appeared, in a sense, to be altogether upside down. If the Government Departments were really desirous that gas managers should do what they could to increase the output of gas, then they must be ready with the facilities to enable the work to be pushed forward. He took it that the latter was a *quid pro quo*, which was quite well understood by all gas managers in these days.

The subject was at this point allowed to drop.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then read the following address:

Gentlemen,—Last year when you honoured me by appointing me your President I hoped that, when the time came for this meeting to be held, the great war which has now been going on for three years would have ended. Since then the Allies have pushed back the armies of the Central Powers, and our position has been made stronger by America joining in with us. But still Peace seems a long way off.

To-day we meet under abnormal conditions—conditions which had anyone had the temerity to prophesy four years ago, he would have been laughed to scorn. But, who knows what we may yet see?

The gas industry during this period has had a very heavy burden to bear. What with the call for men for the army, the substitution of women, the extraction of benzol and toluol, the price and shortage of coal, &c., these are only a few of the troubles which the management have had to bear; and the manner in which these troubles have been borne and met speaks volumes for the organization of the industry, and the men who have had charge of the different works.

It was with great pleasure I read the remarks of Lord Moulton on his appointment as President of the Institution of Gas Engineers, in which he stated how much the country was indebted to the gas industry for having supplied the means of defence, and how he appreciated the work that had been done. We all like to find that the work we have been doing is appreciated; and no one is in a better position to know what the industry has done than Lord Moulton. Therefore, with this tribute coming from him, we feel our work is recognized; and in the midst of our troubles we take heart again, and try to keep going on. I think it would be well if more publicity were given to Lord Moulton's remarks, as it would give consumers, &c., a better idea of what is really being done by the industry.

ASSOCIATION'S LOSSES BY DEATH.

At this point, I should like to refer to the losses the Association has sustained by death since we last met. Mr. William Ewing, a Past-President of our Association, was well known to you all; but for some time past the scenes of his activities were removed from amongst us. Mr. J. Napier Myers, of Saltcoats, took a very active interest in all things connected with the Association, and was a regular attendant at our meetings. Mr. W. Smith, of Ayr, was one of our oldest members. He retired from the position of Manager of the Ayr Gas-Works in 1908. Mr. R. M. Sutherland, of Falkirk (one of our extraordinary members), took very great interest in our Association, and often joined in our discussions. Mr. Arch. Mackay, of Edinburgh (also an extraordinary member), was well known to most of our members. We very much regret the loss of these gentlemen.

EXTENDED USE OF GAS.

Owing to the erection of munition works in many parts of the country, the demand for gas has greatly increased in these places. Many people who had prejudices against gas have had to use it; and I hope in most cases have been converted, and now appreciate its value for heating and furnace work, &c. This has been a great opportunity for the industry to show what it could do; and I feel certain that most of those who perforce had to use gas will, after their experience, continue to do so, provided the price is at all reasonable.

After the war is over many changes may occur. But I think we shall continue to extract the light oils from the gas, which at present are being used for explosives, and in the future may be used for the manufacture of dyes, &c., also as a motor spirit. The gas, I think, will be of even a lower calorific value than the present 500 B.Th.U. standard; and I am hopeful that the investigations which are now going on may bring to light the gas which can be most economically produced—having the most suitable flame temperature for incandescent lighting, heating, and furnace work. Once the quality or value of the gas is decided upon, the manufacturers, I am sure, will make their burners, furnaces, fires, &c., to suit the quality.

We see at the present time what we are able to do with the light oils extracted from the gas; so that after the war, with coal at a reasonable price, and receiving a fair return for our residuals —including the light oils—I have no doubt we should be able to sell gas for fuel purposes at a rate low enough to retain the business we at present have. It behoves us to see that we not only retain it, but increase it.

VALE OF LEVEN GAS COMPANY.

When war broke out in 1914, the Argyll Motor Company were in liquidation; and their splendidly equipped works at Alexandria

were doing very little. When the demand for works for the manufacture of shells, &c., came on, Messrs. Sir W. G. Armstrong, Whitworth, & Co., took over the works for this purpose, with the result that the output of gas from the works under my charge was more than doubled. This morning I intend to give you a few of my experiences in trying to meet this increased output, and that you may follow me better, I shall briefly describe the works as they were before the war.

I became Manager of the Vale of Leven Gas Company's works in the year 1908; the make of gas for the years since then being as follows:

1909-10	52,247,300 c.ft.	1913-14	74,413,600 c.ft.
1910-11	59,230,000 ,,	1914-15	74,350,400 ,,
1911-12	63,951,000 ,,	1915-16	121,700,000 ,,
1912-13	68,257,000 ,,	1916-17	154,350,000 ,,

Showing up to the outbreak of war, a steady annual increase.

The coal-stores have a storage capacity of 900 tons—equal to about five weeks' supply in winter before the war—and are adjoining the retort-houses. The old retort-house contains five ovens of six retorts each, and the new retort-house three ovens of eight retorts each, all on Hislop's patent regenerative system—in all fifty-four retorts, and equal to a maximum daily make of about 400,000 c.ft.

Two small boilers, one 14 ft. long × 4 ft. 6 in. dia., one 10 ft. × 4 ft. 6 in. dia., were situated at the end of the new retort-house. In 1913 we fitted a new boiler, 27 ft. long × 7 ft. 6 in. dia., at the end of the coke yard.

There were two sets of pipe condensers. The first consisted of sixty-four 8-ft. lengths of 5-in. pipes, four in a row—the gas passing through any of the four pipes. The second set of twenty 12-in. pipes were each 14 ft. 8 in. long. The available condensing surface, exclusive of the foul-main, was over 1560 sq. ft. These condensers were described by Mr. W. Currie, my predecessor, in his paper on "Some Experiences with Condensing Plant," read before the Association at the meeting in 1902.

We had also a tower scrubber consisting of two chambers, one filled with boards, which we utilized for working the "C" process; and two rotary exhausters, one capable of dealing with 15,000 c.ft. per hour, and the second one fitted in 1913, capable of passing 50,000 c.ft. per hour. Finding the scrubbers were too small to efficiently deal with the quantity of gas passing, in 1911 a Holmes brush scrubber, capable of dealing with some 500,000 c.ft. of gas a day, was fitted between the exhauster and the purifiers.

The purifiers, four in number, fitted with a Weck centre-valve, were 20 ft. × 20 ft. × 5 ft. deep, with two tiers of grids in each; the gas entering at the bottom and leaving at the top. Oxide of iron only is used. The gas then passes to the rotary station meter, capable of dealing with 30,000 c.ft. per hour, and thence to the gasholders, two in number—one telescopic, of 240,000 c.ft. capacity, the second, single lift, of 120,000 c.ft. capacity.

The gas connections from the foul main in the retort-house, which is 15-in., to the condensers, scrubbers, exhauster, and on to the inlet of the Holmes scrubber, are 10 in., increasing to 15-in. at the scrubber, with 15-in. inlet and outlet to the purifiers, reducing to 10-in. at the inlet and outlet connection to the meter. The inlet pipe to the second holder is 10-in and the outlet 12-in. The inlet to the first holder is 12-in., and the outlet 15-in., reduced to 12 in. at the drip at the holder, and from this point 12 in. to the town governor—a distance of about 150 yards.

The 12-in. outlet pipe from the town governor supplied one 12-in., one 9-in., and one 8-in. distributing mains, supplying the town. The first holder gave a pressure of 4½ in. when telescoped, and 3 in. when uncupped; the second holder, 3 in. We loaded our governor to give a pressure of 3 in. on the town at the heaviest load. We could only maintain this pressure when the large holder was telescoped; so, to get over the difficulty, a De Laval turbine booster was fitted.

When Messrs. Sir W. G. Armstrong, Whitworth, & Co. had taken over the Argyll Works, I had an interview with the manager, who pointed out what quantity of gas he estimated would be required. To meet these requirements, my Company decided to remove the two small boilers, and extend the new retort-house on the site occupied by them, adding two ovens of eights on the same design as the present ones; also to put down one set of water-tube condensers capable of dealing with 1 million c.ft. of gas per day. Unfortunately, we had not accommodation to place this condenser in its proper position before the tower scrubber; and the only site available was alongside the brush scrubber, after the gas had passed through the exhauster.

It was also arranged that a new 10-in. main be taken off the inlet pipe to the town governor, led direct into Armstrong's works, and a 10-in. governor fitted on it. The firm supplied the meter required—a 15,000 c.ft. per hour one, with 10-in. connections.

During the month of December, 1915, our output rose to over 500,000 c.ft. per day; and I had a very anxious time, as the retort-bench and condensers were not finished—having been kept back through want of men and materials. We got them completed in January, 1916; and our next trouble was to get them connected-up, as in both cases we had to stop making. I filled the holders up towards the week-end; and we managed to get finished with the connections all right before the holders got down too far.

The gas, previous to this, was passing through the meter at a temperature of 80° Fahr.; but once the new condensers came into action, this was rectified.

Our output remained fairly steady from January till about June, 1916, when it gradually began to increase, and the works asked for more pressure. I found, on examination, that the meter at Armstrong's works at 4 in. pressure on the inlet was absorbing 13-10ths; again when we increased the pressure to 6 in. at the inlet, the outlet only showed 37-10ths—the meter absorbing 50 p.ct. of the increase. I am sorry that up to the present we have not found out the cause of this; but the result is that we have to boost continuously, so as to maintain a 4-in. pressure at the outlet of the meter.

About this time the purifiers began to give us a good deal of trouble; and on investigation I found that tar was coming forward and choking them. It was decided to put in a washer, and also to alter the inlet and outlet connections to the purifiers, making the gas enter at the top and leave at the bottom—at the same time fitting the purifiers with hurdle grids. These grids were fitted about the month of October; and for some time after all went well. But, occasionally, I was still troubled with back-pressure, and had to open the lid of the purifier causing the trouble. Invariably we found the oxide on the top very moist and sticky; but when the top part was removed the trouble ceased for a time. I decided to try wood-wool spread over the top of the oxide; and this was done about the month of February. Since then I have never had the slightest trouble. The washer, capable of dealing with 1 million c.ft. per day, was connected-up about the middle of last January; and since it was started we have had no trouble with tar going forward. Whether it was the washer or the wood-wool, or both combined, I am not at present in a position to say; only I know I got rid of the trouble, and at a time when, if it had continued, I would have had great difficulty in dealing with it, owing to the shortage of men.

By the month of September our output increased to 640,000 c.ft. per day; and I then felt rather anxious about the coming winter. The output remained fairly steady till about the beginning of November, when the works began to ease-off. They were taking at this time something like 400,000 c.ft. per day—gradually reducing their consumption as the town increased. Had the lighting restrictions not been in force, we could hardly have kept up the supply. In 1915, when we found our works were likely to be very hard-pressed to keep up a supply, we decided to stop fitting any more new cooking appliances. Every house in the district was occupied; it was hardly possible to get lodgings; cookers, &c., were in demand, and it was very disappointing to have to stop fitting them.

The 15,000 c.ft. per hour exhauster was too small for the quantity of gas being manufactured. The large exhauster was started about November, 1914, and has been running since. The firm of engineers who do our work are now on Government work, and could hardly give us an engineer for overhaul. Last year we got one for a few days. But we could only allow the exhauster off for twenty-four hours; so that the overhaul was only temporary. During the recent holidays, we got our plant completely overhauled, which will keep us right for some time to come. Having only one boiler gave us a good deal of worry; but we only had to let steam down once due to trouble with the feed-pipe. It was not a very pleasant sensation to have to stand by helpless while it was being repaired—seeing the holders dropping rapidly.

Owing to the high temperature of the gas passing through the tower scrubber in which we worked the "C" process, I began to experience some trouble with naphthalene in the winter of 1916. The inlet to the No. 1 holder got stopped with it. To clear it, I flooded the drip; then we fixed a piece of wood, 11 in. dia., to the end of a length of ¾-in. malleable tube; and with this we plunged the pipe, using a quantity of "Solvit" in the water. This cleared the obstruction. To prevent the naphthalene gathering again, we introduced a "Simplex Vaporizer" in which we use paraffin oil. The vaporized oil passes into the gas at the outlet of the meter. We have also a connection so that we can pass it direct into the town mains at the outlet of the governor. Since the introduction of the vaporizer, we have had very little trouble; and we are now getting the oil in the drips on the town mains near the works.

Owing to the greatly increased quantity of gas manufactured, we required a number of extra stokers, &c. These were hard to get for a time; but later we got a number from Ireland, and most of them are still with us. When the munition works started, they offered great inducements to men to work in them, with the result that we had to increase our wages. Our stokers have now 19s. per week, and our yardmen 15s. per week, more than their pre-war rates.

I employ a man in the retort-house who does nothing else but clean the furnaces, attend to the dampers, &c., and is solely responsible for the heats—the stokers only attending to the charging and drawing of the retorts, &c. This is unusual for a works of our size; but my experience has been that the better heats, and having only one man who was responsible, warranted the increased cost. The hydraulic mains are washed through with ammoniacal liquor twice per shift of eight hours, which ensures a liquor seal. The pull on the retort-house governor is about 2½ in., reduced at the inlet to just over level gauge. The old retort-bench is in a very bad condition; and at the time the war broke out we were considering the advisability of rebuilding the whole house. The hydraulic main is all in one, and at the centre is about 1½ in. below the level. The hydraulic main on the new bench is subdivided with separate offtakes for gas and tar, which enable us to work with a more even seal.

We purchased the best coal we could get; and it was only through this and the extra good results we obtained, that we were enabled to pull through.

With a works designed to manufacture, under normal circumstances, roughly 400,000 c.ft. per diem, and extended to meet the requirements of about 550,000 c.ft. per day, one can understand the difficulties that we had to contend with to meet an output of nearly 650,000 c.ft.

MAINTENANCE MAN.

About five years ago, I had a number of the usual complaints about the quality of the gas, &c. On investigation, I found the trouble in most cases consisted of dirty burners. I decided to appoint a maintenance man; and I can assure you he has been a good investment. We arrange that he calls on all our consumers at least three times a year. He carries burners, globes, mantles, &c., with him, and should a consumer wish any of these, he fits it free, only charging for the article supplied. Again, should a consumer's burner require cleaning, he cleans it free. By his calling at the houses, I find we get in touch with the consumers in a manner we never did before; and by showing an interest in them, and trying to arrange that they get value for their money, we now find there is a better feeling between the consumers and the Company.

GAS CHEMIST.

Two years ago, Mr. Scott, of Cowdenbeath, when President, brought before you a suggestion that we constitute and equip a central laboratory in (say) Edinburgh or Glasgow. Since then your Council have had this matter under their consideration; and to-day, as you will see from the report, I am able to announce that we have arranged with Mr. Gemmel, of Edinburgh, to take on the duties for the ensuing year, and it now rests with you to confirm this.

The scheme is not quite so elaborate as the one suggested, which was rather much for us to tackle meantime, but will, I hope, meet the requirements of the members. Mr. Gemmel's laboratory is well equipped and suitable for the purpose. He is prepared to do the testing of any samples submitted to him, according to schedule rates. Of course, there are cases where the schedule rates will hardly apply, and these will require to be arranged. The schedule is a very comprehensive one, and reflects great credit on the framers.

It now remains for the members to make a success of the scheme; and, while it is not expected you will make work, still it is desired that you should put forward as much work as possible. I am certain, as time goes on, that we shall all benefit from the scheme, which, with experience, can be improved.

SCOTTISH GAS COUNCIL.

During the past winter, difficulties were experienced regarding coal, &c., and I have no doubt it is well known to most of the members that the engineers and conveners of some of our large cities met and discussed the position—thereafter making representation to the proper quarter in reference to the matter under review. We all appreciate what was done by these gentlemen, as I am quite sure most of us benefited by their representation. But it raised the question in my mind, "Was this Association meeting all our requirements?"

The matter was brought up by Mr. J. W. Napier at a Council meeting held in the spring of the year; and after discussion the feeling of the members was that a Gas Council for Scotland should be formed. The idea was that the Council should consist of (say) the engineers and conveners or chairmen of a certain number of the larger gas undertakings, a certain number of members from the Council of this Association, the President for the time being of the Waverley Association, and the Chairmen of the two Commercial Sections.

The Council would be in a position to take up any question of interest to the industry in Scotland, and would be able to act immediately. In my opinion, the Council should become in some way affiliated to the National Gas Council, and would look after things immediately concerning Scotland in conjunction with the National Gas Council.

This raises another question, of whether the name of the Association is the most suitable one at the present time. This question was brought before the members on a motion by Mr. Carmichael, of Barrhead, at the annual meeting held in 1906, and was finally decided at the meeting held in 1907, when it was defeated. Since then, many changes have taken place; and, while I am averse to changing names, especially where (as in this case) they have been of long standing, still I think if anything is to be gained by the change, the members should give it very serious consideration. Many of the points then raised for and against the proposal still hold good; but when the formation of a Scottish Gas Council is before us, we should also consider this question. An opportunity to consider these questions will be given at the meeting.

COAL CONTROL.

The Coal Controller has now issued his directions for the purpose of re-organizing the transport of coal by public railways, &c., and these, according to the instructions, take effect after to-morrow.

Mr. Thomas Glover, representing the Coal Controller, arranged a meeting with your Council, to which a number of managers of the gas-works most affected were invited. He was accompanied by Mr. Bamford. Mr. Glover and Mr. Bamford explained the new directions, and the whole position was fully gone into—the cases of Perth, Stirling, and Johnstone being cited as showing how the dividing line would adversely affect these works. So far as area No. 17, Scotland, South-Eastern Counties, No. 18, Scotland, North-Western Counties, and No. 20, Scotland, South-Western Area, are concerned, the directions may be regarded generally as satisfactory. But area No. 19, Scotland, North-Eastern, is the one in which the greatest difficulty and trouble will be experienced as regards gas-works. The supplies, according to the directions, are to be drawn from the Fife coalfields, and it is well known that most of these coals are very poor for gas-works purposes—in fact, very few gas-works use more than a very small percentage of the coals. This was fully put before the representatives of the Coal Controller, who indicated that in cases where there was strong evidence that the coal was unsuitable for gas-works, sanction would likely be given to draw upon other areas for a certain percentage of their requirements.

The facts and figures put before us were amazing, and can they but save even one-half of the ton-miles they calculate on, it will be a great achievement.

The Coal Controller has arranged to appoint a neutral person to the Coal and Coke Committee. We considered that the gas industry should have at least one representative, which the representatives agreed to consider with the Coal Controller; and I am now informed he has appointed a second neutral person. Whether this is enough, time alone will tell; but we will hope for the best.

LABOUR.

The supply of labour to keep our works going efficiently has been a constant source of anxiety—principally owing to the requirements of the Army and Navy. The workmen in many cases, knowing the difficulty of filling their places, asked for increases, which, in any other circumstances, would never have been considered. Arbitration was resorted to in many cases, and a settlement made for the time being; but if from any cause whatever a works increased the rate, the others around had to follow suit. In one case the stokers asked for 5s. per week; the matter was discussed with them, and as no agreement was likely to be come to, the manager suggested arbitration. The deputation simply stated that if the arbiter awarded less than the 5s. they would leave, as they would not work for less than such-and-such a place which had granted it. Here was a difficult position, and rather than have more trouble, the manager agreed. The result is, other works have to follow; and so the thing goes on.

Under the Schedule of Protected Occupations, which came into force in May, stokers above 25 years old were exempted. Now I understand the age limit is likely to be raised to 31. This will hit some works pretty hard, as, for instance my own, where I shall lose nearly 50 p.ct. of my stokers. I am afraid there will be great difficulty in finding substitutes; but we must do all in our power to supply the men required and at the same time keep going.

We are bad at present, and may be a good deal worse before the end. But what would our feelings be, should we lose the war, if we had kept some back?

Murray's lines strike me as very appropriate:

"Ye've read aboot Bruce an' Wallace, an' the fechts that they focht langsyne,
An mony a tale an' ballad hauds your forbears' deeds in min';
O, they were the lads for Scotland, they stood for her staunch an' true,
But what o' the bairns that's comin', will they say the same o' you?"

* * * * * *

"Ye stand to the toast 'Wha's like us?' an' shout as ye answer 'Nane,'
Weel, noo is the *time* to prove it, i' the teeth o' the war'l again."

I have had many experiences and difficulties during the last three years, and often was in what seemed a hopeless position. But I never lost hope; and sure enough something always turned up, and got me out of my difficulty. At times like that, I often think of the old Scotch saying, "There's never a bad, but there could be a waur'."

Women have done well in many of the larger works where automatic machinery is employed. In smaller undertakings, where most of the work is done by hand, they are not able to stand it. But we must make the most of them and encourage them to do their best.

CONCLUSION.

Well, gentlemen, in conclusion, I realize I have only touched on a few points of interest, and only the fringe of these. But I am sure you will look with indulgence on any shortcomings which may be apparent to you in this effort of mine, and believe that while I have had much pleasure in writing it, yet the feeling remains that I may not have done justice to my subject, or made myself as clear as I should have liked to my indulgent hearers.

I thank you for the honour you conferred upon me by appointing me your President, and I hope that I hand over the reins of office untarnished to my successor. Let us hope that during his year of office, this war may be brought to a close, and that victory shall crown the efforts of the allies.

Mr. ROBERT MUIR (Galston) said he had been deputed by the Council to propose a hearty vote of thanks to the President for his admirable and interesting address. There had been many capital presidential addresses at Association meetings; but he believed the contribution they had that day had from Mr. Lang excelled anything that had gone before. Mr. Lang, as they had heard, had experienced

many difficulties; but in meeting and surmounting them all, he had shown the grit of a true Scotsman.

The PRESIDENT, in acknowledging the vote, said he felt amply repaid if his address had proved of interest. The address was prepared a little more hurriedly than he anticipated; and in these circumstances he felt pleased if it proved useful and instructive to the members.

Proposed Gas Council for Scotland.

The PRESIDENT said that, before calling upon Mr. J. W. Napier, of Alloa, to open a discussion on the proposal which was being put forward for the establishment of a National Gas Council for Scotland, he would like to read a letter which had been received on the subject from Mr. D. Milne Watson, the Chairman of the Executive Committee of the National Gas Council of Great Britain and Ireland. The letter was in the following terms:

39, *Victoria Street, S.W.*
Sept. 5, 1917.

Dear Sir,—Your letter of the 31st of July, regarding the proposal to form a Scottish Gas Council was considered at a meeting of the Executive Committee yesterday.

It was the general feeling of the Committee that the proposed title, "Scottish Gas Council," would be unfortunate, as it would tend to give the impression that a cleavage had taken place in the unity of the National Gas Council—a body which is recognized by the Government as representing the whole of the gas industry in Great Britain and Ireland.

As the Executive Committee understand that there is no desire on the part of the North British Association of Gas Managers in any way to cause a disruption to the National Gas Council, and that what is really desired is the formation in Scotland of one Association which can represent the views of all the various sections of the industry throughout Scotland, the Executive Committee consider that this object might be achieved by the formation of a Scottish Gas Association or Committee.

The matter you raise is of very considerable importance; and the Committee would be glad, before any definite steps are taken, to meet the representatives nominated by the North British Association of Gas Managers, or any other Scottish Association, to discuss the matter fully at an early date.

I shall be glad to hear from you as to this suggestion, which I hope will be acceptable, when a suitable date and place of meeting can be arranged.—Yours faithfully,

D. MILNE WATSON,
Chairman of the Executive Committee.

John Lang, Esq., Engineer and Manager of the
Vale of Leven Gas Company.

Mr. J. W. NAPIER (Alloa) said the subject which he felt it his duty to bring before the meeting that day was one of considerable importance to themselves as professional men, and of equally great importance to the gas industry. In these days of change, when the future was so very obscure, they would agree with him that they could not hope to proceed on the old lines. The old methods and influences might have proved happily successful in the past; but with the changes now going on, they could not hope to continue, as he said, unless they too made the changes that were so needful in these particular times. It had been borne in upon him that the North British Association in the past had adequately fulfilled its duty as a Technical Association. One feature of its constitution must not be overlooked—namely, that it was a changing body. This, to his mind, was the one feature which explained why the Association had not successfully grappled with the larger questions that affected the industry. It was not proposed as the outcome of the formation of the Scottish National Gas Council that the technical Associations—such as the North British Association, the Waverley, and the Scottish Gas Managers' Associations—should in any degree whatever be altered; nor was it intended that the Commercial Sections should in any way be changed from their particular department of business. The technical and commercial requirements of the industry could only be met by such Associations as he had enumerated; but they in Scotland felt that there were legislative aspects in regard to the consideration and settlement of which they were under certain disabilities, because of the geographical situation of the country. As things were, London was the centre and the pivot round which revolved all the consideration of the more important affairs affecting the industry. This particular disability was one, of course, for which they were in no way responsible; but it undoubtedly had been the means (to some extent, at least) of alienating the Scottish gas managers and engineers, and of preventing them from participating in the discussion of the larger questions that he had just referred to. It was, therefore, with the object of enabling professional men in Scotland to give full justice to these larger questions that this Gas Council for Scotland was proposed. It had been found from experience that Scotland's single representative on the Institution of Gas Engineers was altogether unsatisfactory, in so far as it was not considered a sufficient representation. Similarly, in the case of the National Gas Council, Scotland again was at a disadvantage. As he had already indicated, the geographical position of Scotland furnished one of the reasons, and probably the main reason, why the managers and gas engineers in the country had not been able to take a greater interest in the business of the profession. It was hoped, therefore, that the proposed new Gas Council for Scotland would deal with all questions of immediate interest to the Scottish gas industry and to Scottish gas engineers and managers. They knew, for example, that the majority of works in Scotland belonged to burghs; and in the near future it was expected that the Burghs Gas Supply (Scotland) Act—which so very well met the needs of the industry—was likely to be amended. This was one subject which could best be dealt with by those of them who were in Scotland. Then, as gas managers and engineers, they were also interested in the competition with electricity. They knew that Special Committees were being formed to bring about the centralization of electricity supply; and, because this was so, they in Scotland were fully aware that certain measures of protection must be taken, having regard to the inroads of the competitor to gas—electricity. Then it was also possible that the proposed Gas Council for Scotland would take up the consideration of other matters as, for example, the question of valuations. Just recently it was brought home to many of them that the practice of several of the assessors in Scotland was such that gas companies and gas undertakings were placed at a disadvantage in not being able to get all the deductions they were entitled to. It was, moreover, believed that the Scottish Gas Council would also be helpful to the British Commercial Gas Association, in furthering its interests; and to the Sulphate of Ammonia Association, in promoting its usefulness and its influence throughout Scotland. As regards the constitution of the Scottish Gas Council, he wished to make it perfectly clear that it was not intended to have it separate from, or opposed to, the National Gas Council of Great Britain and Ireland, which had its headquarters in London. The interests of the Scottish Gas Council would be collateral with the interests of the National Gas Council; and it was hoped that the advantage to both would be mutual. It must be recognized that the North British Association—being a changing body—could not be held to be fully representative of the gas industry in Scotland. The Presidents of the Association were elected annually; and that being so, their interests and influences were quickly shed. The position of matters being thus, it became clear that if the Scottish Gas Council was to be successful and satisfactory in its efforts, it must be properly representative of the Scottish gas industry. It required then to be recognized that, on the Scottish Gas Council, there must be the representatives of the larger gas undertakings in the country. Incidentally, he would in this connection mention the cities of Edinburgh, Glasgow, Dundee, and Aberdeen. He specially emphasized the fact that the gas officials of these four cities should be members of the Scottish Gas Council, because of the influence they were bound to have, having regard to the position which they occupied, and the importance of their respective undertakings. It was also proposed that the medium and smaller-sized gas-works in Scotland should be represented on the Scottish Gas Council, and that the North British Association, together with the Waverley Association and the two Commercial Sections, should be asked to nominate members. It would therefore be seen that the Scottish Gas Council would be truly representative, in so far as it would comprise all the influential members of the industry in the country. It was well to bear in mind, when considering this subject, that during the past two years the responsible gas officials in Edinburgh, Glasgow, Aberdeen, and Dundee had taken it upon themselves to meet regularly and to focus the attention of authorities and governing departments on matters affecting the industry. In the whole circumstances, he was prepared now to put forward for the consideration of the meeting a motion to the effect that the gas engineers of the cities of Edinburgh, Glasgow, Dundee, and Aberdeen should meet, along with the Council of the North British Association of Gas Managers, and formulate the constitution of the proposed Scottish Gas Council, with power to report to another meeting.

The PRESIDENT, in inviting some of the gas managers outwith the Council of the North British Association to give expression to their views, said they desired to have an authoritative decision in regard to the attitude which the industry in Scotland was likely to adopt.

Mr. J. D. KEILLOR (Hawick) asked if the work outlined by Mr. Napier in his speech was not capable of being carried out by the National Gas Council of Great Britain and Ireland.

The PRESIDENT said evidently it was not thought so when several gentlemen brought forward this proposal.

Mr. DAVID VASS (Perth) considered that the subject which Mr. Napier had brought to their notice was one that needed very serious consideration. There was one point he did not observe in his address, and that was whether it was intended or suggested that representatives from the various municipal gas committees, &c., should be members of the Scottish Gas Council.

Mr. J. W. NAPIER replied that it was his intention to state that the needs of the industry, both from an influential and a financial point of view, would best be met if they included in the Gas Council representatives of the various municipal undertakings.

Mr. DAVID VASS said he felt quite glad that Mr. Napier was willing to take this course, as he believed it would strengthen the position and influence of the proposed Scottish Gas Council. He would throw out the suggestion, too, that representatives from the principal gas companies in Scotland ought also to be invited to join the Council. The interests of these companies were sometimes quite different from those of the corporation and municipal undertakings. He merely put forward this idea as a suggestion, because he believed it was better that a Special Committee should deal with the subject and bring forward various recommendations in regard to it. The one drawback he saw was that the North British Association of Gas Managers only met once a year, and it would be unfortunate if the scheme should be held up until the next annual meeting. Of course, if they were unanimous, a good deal of initial work in connection with the scheme could be carried on before the next annual meeting of the Association. It seemed to him, further, that the suggestion might also be considered of joining the Scottish Gas Council with the Association under whose auspices they were that day meeting. Certain financial questions would require to be kept in view; and if the Gas Council and the North British Association were linked-up in some way or another, it would be possible to more effectively deal with these.

[No further account of the proceedings had been received from our reporter at the time this number of the "JOURNAL" was made up for press.]

Pacific Coast Gas Association.—Everything promises well for the 25th annual convention of the Association, to be held this month at Santa Cruz. A preliminary announcement to hand from the Secretary (Mr. Henry Bostwick) shows that, following the address of the President, Mr. C. B. Babcock, a long and varied list of papers will be submitted; and there will also be reports by the Chairman of the several Standing Committees. The Gas Appliance Committee have arranged for a gas exhibition; and the social side has by no means been overlooked. At the close of a quarter-of-a-century of life, the Association can boast of 427 names on the membership roll.

CONTINUOUS VERTICAL RETORTS IN A FIFTY MILLION WORKS.

By H. G. RITCHIE, of Irvine.

[A Paper read before the North British Association of Gas Managers, Sept. 7, 1917.]

When I took over the management of Irvine Gas-Works on Jan. 1, 1913, I found the horizontal retort-bench, which consisted of thirty-nine 9 ft. 6 in. retorts, in very bad order, and the holder accommodation only equal to 0·6 of the maximum day's output. I at once started preparations for the telescoping of the larger holder; and, when the maximum period was passed, I made a thorough examination of the old retort-bench, which confirmed my already conceived opinion that a new bench was absolutely necessary.

After careful consideration and visits to other works, both in Scotland and England, and as our storage was ample, and lying-off would be avoided, a vertical installation was decided on. From experience gained in the working of continuous verticals, although proper holder accommodation is as advantageous as it is with horizontals, it is not more necessary, owing to the variations that can be effected in the output per retort by varying the speed of the coke extractors. The installation is on the Woodall-Duckham Company's continuous system, and comprises six of their standard "3-ton" retorts. This was the first installation of these small retorts to be erected. The entire installation, setting, engine-house, and lift occupies a space of 60 ft. × 30 ft.—sufficient space being left for an extension of two retorts when required. The guaranteed daily production of gas was 250,000 c.ft., but without pressing the plant or producing blue-water gas, taking over a month, the daily average output per retort was 50,200 c.ft.—*i.e.*, equal to 301,200 c.ft. for the installation. The maximum day's output per retort was 59,000 c.ft.

DESCRIPTION OF THE RETORTS.

The retorts, which are 25 ft. long, are placed in two rows of three retorts each, heated by two furnaces, one for each side. Each retort is a separate unit; a straight joint being built between each. The furnaces, which are of the stepped grate type, are large enough for four retorts each—provision having been made for extension. The primary air supply to the furnaces is pre-heated, and is led over a vaporizing pan; the moist and heated air passing into the furnace through two hoods provided with regulating dampers. The vapour in the air tends to keep the clinker soft. With coal having a high ash content, however, I have found it advisable to provide a steam supply as well; but only a very small quantity is necessary. The furnaces are cleaned three times weekly, running two periods of 48 hours and one of 72 hours. The fires were pricked-up once per 8-hour shift. The carbonic oxide flues run along each side of the setting, and an up-take, with regulating damper, is provided, one on each side of each retort. The secondary-air flue is common to both sides of the setting, and runs along the centre of it, with off-takes the same as the carbonic oxide flues. Combustion occurs practically at the top of the retort. The carbonic acid is divided into two streams down each side of the retorts, and two dampers are provided on both sides at the retort bottom, to enable the heats to be equalized. It is then brought to the main carbonic acid damper, and thence to the regenerator. Three main dampers are provided at the end of the regenerator. All internal brickwork, including the retorts, is built of tongued and grooved bricks. The chimney is constructed of steel, brick lined, and gives a minimum pull of 7-10ths, which is ample for the efficient working of the plant.

HOUSING OF THE PLANT.

There is, strictly speaking, no retort-house. The installation was erected in what was a coal-store. In order to cover in the bottom portion of the plant, the existing walls of the shed were raised, and lean-to roofs carried from the wall to the buckstaves; thus covering in the carbonic acid damper platform and a portion of the brickwork. On the top of the setting the steel framed structure carrying overhead bunkers is extended, and arranged to take a light steel roof. Angle steel purlins are fitted to the steel framework; and these carry the corrugated asbestos sheets with which the sides of the part of the installation above the setting is completely covered in. The roof and lean-to roofs are also covered with corrugated asbestos sheets. Twelve feet of the setting brickwork is exposed, although sheltered from the rain to an extent by the upper or carbonic oxide damper platform.

METHODS OF WORKING.

The coal, and the coke for the furnaces is raised to overhead bunkers in skips by means of a 25 cwt. belt-driven lift; the power being supplied by a National gas-engine. The capacity of the coal-bunkers is 36 hours maximum requirements, and the coke-bunkers 48 hours. From the bunkers, the coal passes through a throughway valve into the feed hoppers, the capacity of which is 1¼ to 2 hours, according to speed of the coke extractors. In working, we fill-up every hour. The coke-extractors are of the Woodall-Duckham Company's usual type, and are operated by a small steam-engine. The coke-chambers under the retorts have a capacity equal to two hours' production of coke. The discharging doors are of a type somewhat similar to the Tangye door. I found the facing got so bad in about three months' time that they had to be faced-up. This was due to the water admitted at the top of the coke-chambers washing down the coke-dust; and though the operators wiped the faces, probably the extractor had come into operation, or more dust had been washed down, before he got the door closed. To save the cost of facing, and as it is the underside that was affected most, I had V-shaped troughs made, in which the lower half of the door is sealed in water. The gas passes from the retort by an arched offtake; a disc-valve being provided for each retort. The gas passes to a common hydraulic main, which has a fall to one end, where a tar overflow and seal-pot are provided. The hydraulic main and rising main from it are flushed with liquor daily. Three times weekly would be sufficient, but by making it a daily duty there is less chance of it being forgotten. The offtakes are not sealed in the liquor.

In working, it is advisable to scurf the retorts after six to seven weeks' working, although I have run for ten weeks without having much trouble with charge hanging. This will, of course, vary according to nature of coal used. Most of the carbon is to be found in the top 10 ft. Air is allowed to pass up the retort until the carbon drops off. Scurfing takes 60 hours, including the emptying and refilling of the retort; but if bars were used, it could be accomplished in less time.

The only repair to the brickwork so far has been the renewal of the lining of one furnace. I do not anticipate the renewal of retorts for a considerable time yet.

In working at present, the coal travels through the retorts in fifteen hours, using coking nuts. I have tried splints, a mixture of cannel and coal, also unscreened coal and coking coal; but coking nuts are by far the most suitable fuel.

As this type of retort cannot be worked without an exhauster, either boiler or exhauster should be in duplicate. In our case, I had a new 22 ft. × 6 ft. Cornish boiler put down, as the age of our old boiler is doubtful, and has only been insurable for 45 lbs. pressure for many years. My Company bought it second-hand 25 years ago. I also had a pump exhauster which had been out of use, overhauled and parts renewed; so that we now have both boilers and exhauster in duplicate.

WORKING RESULTS.

The working results taken over the year have not been so satisfactory as they should be, due to certain trouble with the coke-discharging doors mentioned previously. To avoid drawing in air at these doors, it was necessary to work with a pressure of 3½-10ths to 4-10ths at the top of the retort, and as a further safeguard the rate of extraction was quicker than it has been since the troughs were fitted. However, the actual figures for the year are:

Gas per ton of coal used	10,825 c.ft.
Coke sold per ton of coal used	6·52 cwt.
Tar and liquor mixed, per ton used	67·45 gallons.

I cannot give the calorific value of the gas, as the calorimeter has only been in use since the close of the year.

Since the troughs were fitted, six months ago, I have worked with about 1-10th inch pressure at the top of the retort; and the average make per ton has been 12,039 c.ft., of a calorific value of 520 B.Th.U. The make per retort per day is now reduced to 45,000 c.ft., or 270,000 c.ft. for the installation. Over the past three months, with one furnace only working, the coke sold per ton of coal has been 7·51 cwt., due to better adjustment of the primary air. The original regulating damper having jammed, an ordinary tile damper has been substituted. We are also pricking fires twice daily, instead of three times as formerly.

I should state here that in similar installations to the Irvine one, since erected in Scotland, the Woodall-Duckham Company have provided their standard type of coke discharging door. The departure from this at Irvine was to reduce the cost of the installation.

The average strength of liquor was 4·6° Twaddel, giving an average yield of 57·24 lbs. of sulphate per 100 gallons, from the free ammonia only. These are figures given us by tar distillers—our liquor being sold on a yield of sulphate per 100 gallons basis. This works out at 31·74 lbs. of sulphate per ton of coal carbonized, assuming the yield of tar to be 12 gallons per ton used. The average of two samples of liquor gave 12·15 p.ct. of fixed ammonia; but as the tar distillers to whom the tar and liquor are sold have no plant for recovering this, we get no credit for it.

To depart from the subject of verticals for a minute, I notice greater differences in the yield of sulphate from liquor of the same Twaddel, or nearly so, than I hitherto expected to find. Distillers' reports on consecutive dates were:

Week ending April 19, 1917.	Twaddel	4·9.	Yield of sulphate	63·4 lbs.
" 26 "	"	5·0	"	64·4 "
April 27 to 30, 1917.	"	5·25	"	60·3 "
May 1 to 10 "	"	5·0	"	59·5 "

As is now well known, vertical retort tar is not so efficient as horizontal tar for toluol recovery. The results are:

	Untreated Tar.	Treated Tar.
Specific gravity	1·095	1·09
Percentage of crude naphtha up to 145°	1·5	4·08
Percentage of crude naphtha 145°–170°	1·4	2·02
Toluene in 200 gallons (5 p.ct. water content), lbs.	2·4	11·75
Benzene in 200 gallons (5 p.ct. water content), lbs.	not stated	25·15

The best results with horizontal working at Irvine were—

Gas per ton of coal used	9702 c.ft.
Coke sold per ton	7·68 cwt.
Tar and liquor, liquor 3·75 to 4 Twaddel	52·84 gallons

At another Ayrshire works with horizontal retorts, the average results over five years have been:

Gas per ton used	10,124 c.ft.
Coke sold	7·5 cwt.
Tar and liquor mixed	58·2 gallons

I have run several twenty-four hours' tests, for gas only, with the following results:

		C.Ft. per Ton.		B.Th.U.
(*a*)	Ayrshire treble nuts	10,900	..	—
(*b*)	,, ,, ,,	12,335	..	510
(*c*)	,, coal	11,855	..	515
(*d*)	,, splint	10,813	..	508
(*e*)	Lanarkshire coal	12,538	..	504
(*f*)	,, ,,	12,870	..	516
(*g*)	,, ,,	12,734	..	530
(*h*)	,, nuts	13,327	..	499
(*i*)	,, ,,	12,883	..	520
(*j*)	,, ,,	12,960	..	499

Carbonizing costs (stokers only) worked out at 1·649d. per 1000 c.ft. made, and with horizontals for the last complete year, adding the increase in wages to make the figures comparative, at 3·248d. Wages for coal handling and gas consumption of the engine, for verticals cost 0·601d. per 1000 c.ft. made. The cost with horizontals was 0·507d. One stoker per eight-hours' shift is employed all the year round. The stoker's duties, besides attending to all work on the retorts except raising coal, include wheeling away coke, attending to the boiler and exhauster, also the tar-pump. The coal is raised at night for the twenty-four hours, so there are always two men on the works.

STEAMING.

I have only been in a position to start steaming this week. I am at present working three retorts, and have a steam supply fitted to one retort only. There is a ¼-in. steam wheel-valve on the main supply, and a ¼-in. steam plug-cock (to which latter a scale has been attached, to enable me to tell accurately how much the cock was open) on the pipe led into the coke chamber above the coke extractor. The following are the results of two trial runs:

First Run.

Run.	Steam.	Make per Hour.	Average Value.	Length of Jet Flame.	Steam Pressure.
		C.ft.	B.Th.U.	In.	Lbs.
4 hours	No steam	5600	517·5	3·00	—
4 ,,	Steam cock quarter open; valve open quarter turn.	6150	507·0	2·95	60

Second Run.

3 hours	No steam	5180	517	7·3	—
2 ,,	Cock quarter open; valve quarter turn.	5200	—	7·2	48
4 ,,	Cock full open; valve one-third turn.	5800	514	6·7	48

This gives an average increase in the output of about 11 p.ct., which, added to the unsteamed make of 12,039 c.ft., give us 13,363 c.ft. per ton, with a decrease of 2 p.ct. in calorific value.

The coke extractors were run at the same speed and the same pressure—viz., 1-10th of an inch, maintained at the top of the retorts throughout. The top heats during the runs were 2246° and 2282° Fahr. respectively. In my opinion, better results could be obtained from steaming, if the hottest zone was further down the retort. This could be done without much structural alterations, by carrying the secondary air further down.

For the benefit of managers in works such as those of which I am in charge, I would just say that vertical retorts will not eliminate all their worries. After the plant was properly started, I have not had any real difficulties in working them; but, at the same time, they require more skilled attention than can be given by the ordinary gas stoker. However, against this, the reduced anxieties—no one is absolutely free from them—due to labour troubles have amply compensated me for the extra attention I have had to give to the vertical retort installation.

THE DEHYDRATION OF TAR.

By G. H. SHARPLES, of Glasgow.

[A Paper read before the North British Association of Gas Managers, Sept. 7, 1917.]

The term "dehydration" has different meanings when used by the tar distiller or the gas engineer. The tar distiller usually suggests by the term a simple preheating of the tar, by means of waste heat economized either from the flues of the stills or by heat recovered from the vapours of the distillates from the tar plant, using the tar as the cooling medium instead of water. The gas engineer, however, understands by the use of the term, the distillation of the light oils, together with the water present, leaving a product known as dehydrated or refined tar, which is suitable for use in road spraying. The light oils thus obtained can be sold as such to the distiller; but in some cases they are rectified in small stills on the spot—the latter being considered as integral parts of the tar-distillation plants.

The "Call of the War" appears to have modified considerably the use of the latter portion of the plants, as no real separation into the pure products, benzene, toluene, xylene, could be made in these small stills. It is now deemed advisable to transfer the crude oil to the tar distiller, who, with larger plants and more perfect fractionation, can produce these valuable products continuously, in a practically pure state. In order to understand clearly the work which these plants are called upon to do, it is necessary to have a general knowledge of the constitution of tar, as revealed by general tar distillation.

COMPOSITION OF TAR.

The composition of the tar varies, of course, through many causes. The following are the principal:

1.—Quality of coal, dependent on the district.
2.—Type of retorts used—horizontal or vertical.
3.—Temperature of carbonization.

1.—The quality of coal cannot always be governed absolutely, as the gas engineer is dependent chiefly on the nature of the coal obtainable in his own district. For example, Scotch coals generally yield less tar than (say) Lancashire coals. Again, Lanarkshire coals yield a class of tar differing from the Fife coals.

2.—Once the gas engineer has decided which class of retort to instal for gas making—that is, the one which will give him the best yield of gas—so, in a large measure, has he determined automatically the quality and yield of tar.

3.—The temperature of carbonization alone can be controlled, and naturally this is done for the primary object—yield of gas.

But the "Call of the War" has altered this considerably, and gas engineers are now asked by the authorities to work with a view to increasing the output of the products required for the successful prosecution of the war. It is also quite certain that, when normal times return, the demand for these products in this country will continue and grow, by reason of the demand for intermediate products for synthetic dyes, which will absorb the same compounds which now are used for high explosive and munition work generally. It is necessary, then, to examine tar hydration as practised in gas-works from this standpoint. Does this method of working-up the tar yield the valuable products to the greatest advantage to the country. To answer this question, let us look at the composition of tar yielded. The same class of coal was carbonized at two different gas-works in Scotland—one with horizontal retorts, and the other with vertical retorts—giving the following results:

	Horizontal Retorts. P.Ct.			Vertical Retorts. P.Ct.	
Water	1·55	..		2·42	
Crude naphtha	2·62	12·06	..	2·44	18·55
Light oils	9·44			16·11	
Carbolic oil	12 09		..	14·10	
Creosote oil	13·00		..	21·47	
Pitch	61·30		..	43·38	
Loss	—		..	0·08	
	100·00			100·00	
Specific gravity of tar at 60	1·20		..	1·075	

On the obvious effects of carbonization under the two methods, I need not dwell.

These, resolved further, show the following constitution:

	Vertical Retorts.			Horizontal Retorts.		
	Gallons per Ton.	Per Cent. by Weight.	Pounds Ton Coal Carbonized.	Gallons per Ton.	Per Cent. by Weight.	Pounds Ton Coal Carbonized.
90's benzol	1·340	0·515	0·747	2·507	0·984	1·299
90's toluol	0·832	0·317	0·460	0·818	0·318	0·420
Solvent naphtha	4·252	1 615	2·342	2·537	0·986	1·302
Total naphtha	6·424	2·447	3·549	5·862	2·288	3·021
Heavy naphtha	6·240	2·409	3·493	3·979	1·652	2·178
Refined pyridine	0·354	0·160	0·232	0·160	0·76	0·100
Heavy pyridine bases	0·832	0·383	0·555	1·165	0·532	0·702
60's carbolic acid	2·311	1·074	1·557	0·200	0·094	0·124
Cresylic acid	12·48	5·913	8·574	5·230	2·451	3·234
Light creosote	16·039	7·126	10·339	43·065	20·381	26·902
Heavy creosote	66·102	31·009	44·965			
Naphthalene	6·839	3·455	5·017	9·00	4·620	6·098
Pitch	..	43·380	62·901	..	66·425	87·7
Am. liquor, 3·3 per cent. NH_3	5·366	2·420	2·030	2·980	1·356	1·800
Loss	0·322	0·224	0·325	0·280	0·125	0·165

Examination of the rectified naphthas gave the following interesting results:

	From Vertical Retorts.		From Horizontal Retorts.	
	P.Ct. Paraffin.	Sp. Gr.	Paraffin.	Sp. Gr.
90's benzol	19	·865	Below 1 p.ct.	·881
90's toluol	12	·863		·872
Solvent	6	·851		·871

In passing, I would call your attention to the quality of the naphthas recovered from vertical retorts. This opens up the most important question as to whether it is advisable to work-up together tar from horizonal and vertical retorts, when the object is to make pure products. Even when the tar is distilled on the gas-works, the same question presents itself with respect to the recovered light oil from the dehydration plants.

The next question in the examination of the product is from which fractions are the valuable products recovered, particularly in dehydration plants? The rectified naphthas naturally are recovered from the crude naphthas and light oils in ordinary tar distillation, and from the light oils given off in the process of dehydration. But, unfortunately, all the rectified naphthas are not thus recovered. The crude naphthas and light oil given in the preliminary distillation correspond to the portion of the tar that is driven off during dehydration. Considerable quantities of creosote are also carried over in dehydration, because real fractionation is at a minimum, and, conversely, considerable quantities of naphtha are left in the dehydrated tar. Examination of the oils distilled from the dehydrated tar reveals this. The ordinary retort test does not show the presence of light oil; but careful fractionation shows that the oil distilled between 175° and 270° C. from the dehydrated tar can contain as much as 2 p.ct. of light naphthas.

Retort Test. Dehydrated Tar, Per Cent. by Weight.		Fraction 175° to 270° distilled through Column after Washing.	
Drop	175° C.	90's benzol and toluol	0·5 p.ct.
175-270°	13·33 p.ct.	Solvent	0·5 ,,
270-315°	14·02 ,,	Heavy naphtha	11·0 ,,
Free carbon	6·01 ,,		

The percentages of naphthas left in the tar compared with the total quantities in the original tar are:

90's benzol and toluol	8·0 p.ct.
Solvent	5·8 ,,
Heavy naphtha	44·5 ,,

The effect of these bodies on the dehydrated tar will be examined later.

The tar acids, however, present the greatest interest. These are found chiefly in the carbolic oil, or middle oil, fraction in ordinary distillation—the fraction which corresponds to the lighter portion of the heavy oils left in the dehydrated tar. A large portion is recovered in the crude oil taken off in the dehydration, by reason of the quantities of creosote carried over with the oil; but 50 p.ct. of the total quantity is left in the dehydrated tar.

The following comparison between the light oil and carbolic oil fractions confirms this:

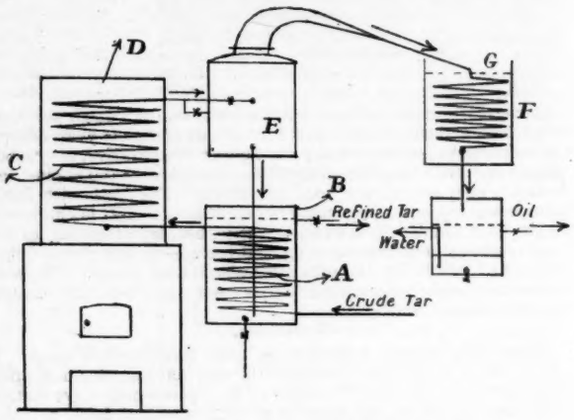
—	Crude Naphtha and Light Oil Fractions.	Carbolic Oil and Light Creosote Fractions.	Dehydrated Tar Oil, 270° C.
	Gallons per Ton of Tar.	Gallons per Ton of Tar.	
Total tar acids	4·76	4·78	4·7
Phenol	·66	·092	Not estimated

In compensation, however, it will be noticed the tar acids in the light oils are much richer in phenol or carbolic acid than the creosote. At present, when the crude oils are being disposed of as such, it is probable the tar acids contained therein are being recovered; but in the simple system of washing, instituted on these plants, these valuable products do not seem to be saved. A comparison of the light oils yielded from these plants with the light oils as obtained by the ordinary method of distillation is interesting:

—	A. Light Oils from Ordinary Distillation, Horizontal Tar.	B. From Dehydration Vertical Tar (Kilmarnock).	C. From Dehydration Vertical Tar (Johnstone).
	P.Ct. by Vol.	P.Ct. by Vol.	P.Ct. by Vol.
Tar acids	22·21	27·5	27·0
Pyridene bases	2·74	5·0	7·0
90's benzol	5·15	1·9	1·0
90's toluol	2·94	2·2	1·5
Solvent	10·54	6·5	3·5
Heavy naphtha	8·18	4·8	6·7
Creosote	44·20	48·1	51·3
Loss	4·04	4·0	2·0
	100·00	100·00	100·00

In comparing these, it must be borne in mind that the two latter oils are from vertical tar, which yields more naphthas than horizontal tar. The character of the naphthas with respect to paraffins is that which is expected from vertical tar. This, however, has no bearing on the present subject. An examination of these figures, together with those of the dehydrated tar, shows that separation is even worse than in ordinary tar distillation. This may be explained physically in this manner. The tar is heated to 230° to 250° C, and is under a pressure of about 50 lbs. When this tar passes into the vapour box, the pressure is suddenly released, causing the rapid evaporation of the light oils and a large proportion of creosote. With the decrease in pressure and temperature, much creosote is recondensed, dissolving a small proportion of the light oils. The pressures of the creosote in the vapour and the creosote in the tar will rapidly reach equilibrium; but the partial pressure of the light oils in the vapour will be much greater than the partial pressure of the light oils in the tar, which can be assumed to be almost *zero;* hence a slight redissolving action.

The construction and method of working these plants are known to all gas engineers; but an epitome of the general arrangements will probably be acceptable. The crude tar is pumped from a receiving tank through a coil A, 1½ in. diameter, passing through an economizer B, heated by the dehydrated tar, and from there passes through a coil C, 3 in. diameter and about 150 ft. long,



Diagrammatic Sketch of Dehydration Plant.

enclosed in a specially constructed flue D. From the top of the flue the pipe passes into the vapour box E, where the pressure due to the temperature acquired in traversing C is released, and the light oils and water are liberated. The dedydrated tar passes to the base of the economizer B, and there gives up the major portion of the heat to the crude tar in the coil A. The cooled tar is then pumped to the store. The vapours from E pass through a condensing coil F, surrounded by water in a tank G, and thence the oil passes into the receiver, where it is separated from the water.

Through the kindness of Mr. James Dickson, of the Johnstone Gas-Works, I have been enabled to run tests of the dehydration plant at the works.

FIRST TEST (4 hours).

Crude tar (mixed Johnstone vertical and Kilbarchan horizontal).

Total used, 349 gallons	Aver. temp., 105° Fahr.
Quantity per hour (av.), 87·25 galls.	(Max., 107 galls.; min., 50 galls.)
Average speed of travel through coil	285 ft. per hour.
Time tar is exposed to heat	31'5 minutes.
Temperature leaving coil, 236° C.	(Max., 240 galls.; min., 230 galls.

B.—*Light Oil.*

Recovered	192 gallons.
Water	19 ,, 9 p.ct. on oil *plus* water.
Rate of flow of oil only	48 ,, per hour (max., 79 gallons; min., 28 gallons).

C.—*Dehydrated Tar.*

Recovered	125 gallons.
Rate of flow	31·25 gallons per hour (max., 38 gallons min., 25 gallons).

TESTS OF MATERIAL.

	Crude Tar.	Light Oil.	Dehydrated Tar.
Sp. gr. at 60° Fahr.	1·080	1·002	1·16
Viscosity	—	—	66 sec. (Hutchinson)
Distillation—			
	P.Ct.		P.Ct.
Water	6·77	—	*Nil.*
To 170	9·28	—	*Nil.*
170 to 270	23·02	—	12·2
270 to 315	9·86	—	10·8
Free carbon	5·23	—	6·27

The oil from above to 315 was analyzed and gave:

ANALYSIS.

Sp. gr. at 60° Fahr.		1·010
	P.Ct.	P.Ct.
Tar acids	27·0	23·0
Pyridine	7·0	2·0
90's benzol	1·0	Trace
90's toluol	1·5	0·05
Solvent	3·5	1·75
Heavy naphtha	6·7	3·00
Creosote	52·3	67·2
Loss on working	3·0	4·0
	100·0	100·00

SECOND TEST (4 hrs. 40 min.).
Crude tar—as before. Temperature, 146° Fahr.

A. Total used . . . 407 gallons.
Rate of flow. . . 87·2 gallons per hour (max., 98; min., 60).
Speed of travel through coil . . } 285 ft. per hour.
Time exposed to heat . . . . } 31·5 min.
Temperature on leaving coil . . } 243° C. (max., 250 gallons; min., 235).

B.—*Light Oil.*

Total oil recovered 224 gallons.
Water . . . . 22 ,, = 9 p.ct. on oil and water.
Rate of flow oil only . . . . } 48 gallons per hour (max., 74; min., 20).

C.—*Dehydrated Tar.*

Total recovered . 175 gallons.
Rate of flow . . 35·3 gallons per hour (max., 50; min., 24).

These two results generally agree. The slight excess in the quantity of tar in the second test can easily be accounted for, as probably some tar remained in the plant from the first run. The characteristics of the dehydrated tar made are of the greatest interest, as showing the general effect this mode of working has on the free carbon. The free carbon in the crude tar made at Kilmarnock, which I obtained through the kindness of Mr. Fairweather, was 5·001 p.ct. The free carbon in the refined tar from the same place was 6·01 p.ct. This indicates that the tar does not suffer from any breakdown in its passage through the coil. Cross showed in a recent paper (Feb. 17, 1917) that vertical tar was apt to suffer materially in this respect in the course of ordinary distillation, accompanied by a very large increase in free carbon—viz., 6½ times.

From this, it may be assumed that there is very little danger from pitching in the coil; and any occurrence of this nature could be attributed with certainty to neglect. The plants I examined were rated at 4000 gallons per twenty-four hours. The actual work being done is about 2100 gallons per twenty-four hours. When working horizontal tar, it is probable the first figure can be attained; but in working vertical tar, owing to the increased quantity of light oils present, coupled with the generally lighter gravity of the creosote and the low free carbon content, it is necessary to take out more oil. The most serious drawback, however, is the quantity of valuable products left in the dehydrated tar. The light oil also made in this way contains too much creosote, which lowers its value and increases the difficulty of subsequent recovery.

At many gas-works it is difficult to find continuous work for these stills. At Johnstone, however, the plant is used for the liberation and recovery of benzol from benzolized creosote, which effects a considerable saving.

Wales and Monmouthshire District Institution.—There will be a meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers on Wednesday of next week, at Briton Ferry, the home of the President (Mr. J. Mogford), who will deliver his Inaugural Address. There will also be a paper by Mr. W. H. Cattell, of Swansea.

A German Dyestuffs Combination.—Referring to the rapid growth of the United States dyestuff industry during the war, the American correspondent of the "Chemical Trade Journal" says that serious attention has been given to this movement by the German concerns formerly controlling the market, and has assisted in uniting these great rivals in Germany for mutual protection. A combination has been formed of the seven leading manufacturing concerns; and particulars available show that "a formidable understanding has been reached between the manufacturers of dyes and colours which cannot fail to affect future prices and the export policies to be followed after the present war." Reviewing what has been accomplished in Germany, he points out that the Badische Anilinfabrik has since 1913 so successfully applied the Haber process of extracting nitrogen from the atmosphere and production of synthetic ammonia and sulphate of ammonia therefrom, that while the ammonia output amounted to only about 30,000 tons in that year, it increased to 60,000 tons in 1914, to 150,000 tons in 1915, and to 300,000 tons in 1916, with an estimated figure of 500,000 tons for 1917.

Ammonia from Gas Liquor.—The "Chemical Trade Journal" a week ago contained an inquiry from a correspondent who said he was desirous of preparing liquor ammonia by direct distillation from gas liquor, and found that two methods were advised for the prevention of colour in the liquor, due to empyreumatic oils—viz., by passing the ammoniacal gas through charcoal, and by washing it with oil. The charcoal he had tried, without success; and he wanted to know what kind of oil should be used for the purpose. Replying in the current issue, Mr. B. Dunglinson (for Messrs. Blair, Campbell, and M'Lean, Ltd.) says: "In our process for manufacturing pure aqua-ammonia (of, approximately, 35 p.ct. strength), we have certain purifying towers which are packed with charcoal and oil respectively; the object of the charcoal being to retain H_2S and noxious gases which have a tendency to form ammonia polysulphide, and impart a yellow colour to the resulting liquor. The object of the oil is to absorb empyreumatic oils, usually pyridine and its homologues; and for this purpose a petroleum oil is quite satisfactory—say, a 'solar oil' or 'gas oil.' As a matter of fact, any of the petroleum oils boiling at (say) 250° C., are satisfactory for this purpose."

GAS FROM WOOD.

As several communications of late have shown, the scarcity and cost of coal on the Continent have driven many gas makers to substitute for it, as far as possible, supplies of such wood as could be used with reasonable success and was obtainable in the neighbourhood of the works. Perhaps the fullest particulars of actual working under these conditions which have been published are those contained in a paper read by M. Rothenbach, who is Manager of the Perouse Gas-Works, at a meeting of Swiss gas makers held at Vevey. The following is an abridged translation of this communication as recently published in the "Journal des Usines à Gaz."

The Perouse Gas-Works were laid out in 1912 for a make of 4000 cb. m. (141,000 c. ft.) per twenty-four hours. The occurrence of lignite beds in its neighbourhood prompted the erection in the first instance of furnaces adapted for burning this description of fuel. These were very tall generators, provided with a series of grids, and charged from the top. The charge of each was over 200 kilos (440 lbs.) of wood. Each generator supplied two furnaces, taking five retorts, and could be used for one or both furnaces, as required. With the growing cost of gas coal, the lignite was used in the retorts to the amount of some 400 tonnes, with fairly satisfactory results. Since then the abundance of oak in the neighbourhood of Pelouse has been drawn upon as a partial substitute for gas coal. The start was made with one part of wood to four parts of coal—a change which at once required one of the three purifiers to be charged with lime mixed with wood shavings, in place of oxide. With this small proportion of wood, no further change was found necessary. Subsequently, the consent of the Municipality was obtained to the distillation of other materials than coal; the company at the same time undertaking to keep the price of the gas to a reasonable figure. It was later on fixed at 33 c. per cb. m. [7s. 6d. per 1000 c.ft.]. After using a larger proportion of wood, it was found that the composite charge in the retorts was not a practicable system; and for over a year past wood has been used alone. Under these conditions the oxide in all three purifiers was replaced by lime, and attention was given to three difficulties chiefly experienced—viz., obstruction of pipes and hydraulic main with a hardened deposit of tar; the reduction of the labour and cost of cutting the wood to the required size; and the charging of the retorts and quenching the wood coke.

The wood is distilled at the normal temperature of the retorts, for from two to three hours according to the size of the pieces. The wood is cut in September, October, or November, and thus is fairly dry. It is obtained in pieces measuring about 3 ft. in length, and from 1½ to 5 in. diameter. Larger pieces, and those of less regular shape, are used in the furnaces. For distillation, the 3 ft. pieces have hitherto been used; but trials are being made of pieces from 12 to 20 in. in length, for the sake of more convenient handling, though the larger pieces seem better adapted for distillation. Also for readier handling, trial has been made of a trough-shaped receptacle of sheet iron, fitting the retort and allowing of the wood being pushed into the latter. Since the retorts are 10 ft. long and 25 in. × 14 in. section, their charging with 440 lbs. of wood at a time and by one man is heavy work.

The quenching of the wood coke on its removal from the retorts is a problem which has not yet been satisfactorily solved. Were it not that the use of wood was temporary, sheet-iron covered receivers would have been made for the purpose of quenching the coke by the exclusion of air; but in the circumstances the outlay did not appear justified. Thus the coke has been quenched like that from coal—giving a very wet coke, as well as one in very small pieces, owing to the breaking-up of the incandescent material on the application of water. Nevertheless, the coke has been sold at a price of nearly 9 lire per 100 kilos. [about 3s. 6d. per cwt.]. Containing some 30 p.ct. of water, it represents about 80 p.ct. of the production.

In the avoidance of stoppages in mains from hardened tar, it was found necessary to take measures diametrically opposite to those recommended by Reissig in his "Treatise on the Distillation of Wood." Instead of cooling the hydraulic, it was kept at a temperature between 85° and 95° C. by supplying it with the minimum of water. This allows the tar to flow to the water-cooled tubular condenser, which is kept at a temperature of from 65° to 88° C. At this temperature, the tar is still fluid, and passes to a large syphon boiler placed under the main coming from the the furnace-house. The syphon is emptied by reducing its 4-in. pipe to a length of 3 ft., and then letting the tar pass to its tank in an open channel. This was necessary owing to the tendency of the tar to adhere to the sides of a pipe and so give rise to stoppages.

The denser portion of the tar having been removed, the gas is very rapidly cooled in an atmospheric condenser, by which the more volatile elements of the tar are condensed to a strongly acid aqueous liquid, containing considerable quantities of acetic acid. The Pelouze and Audouin washer was left in action, although scarcely anything was condensed in it.

The chief problem, however, was the removal of the carbonic acid, present at times in the proportion of 30 p.ct. and averaging 28 p.ct. Although it was found that dry lime in the purifiers absorbed practically the quantity of carbonic acid which it should according to theory, experience pointed to a supplementary method. With dry lime in the purifiers, it was necessary to

charge a purifier each day; and it was hardly possible to avoid this re-charging on Sundays, even when the make did not exceed 900 cb.m. per day. Trial was, therefore, made of washing the gas with milk-of-lime. Of the two washers used for this purpose, the first was of a very primitive type. It consisted of a main, 23½ in. diameter and 10 ft. long, fixed to a base and fitted with a raised bottom for the inlet and outlet of the gas. It was filled with pieces of wood about 1 ft. in length. A syphon on the cover admitted the milk-of-lime. The second washer was of the "Standard" type, with a base about 11 sq. ft. and 11 ft. in height. The interior grids had to be removed, as they speedily choked with the precipitated chalk. The best results were obtained only after replacing the grids by lengths of wood on which were laid fine branches almost completely filling the apparatus. The milk-of-lime was produced continuously with a mechanical stirrer, and circulated through the two washers by means of a small pump without an intermediate tank. Keeping a strength of 4° to 6° Baumé in the mixer, 300 kilos [660 lbs.] of quicklime sufficed to wash the gas throughout twenty-four hours. One advantage of this wet method which cropped up afterwards was that the chalk from the washers could be disposed of for building work. The labour involved in the process was almost *nil*, in comparison with the dry purifiers.

In dealing with the carbonic acid, it was found that the quantity in the gas varied greatly with the quality of the wood and with its condition of moisture. Very great differences were likewise found in the action of different makes of lime. A lime which was almost brown worked well in the purifiers, but not in the washers; while a white lime, which worked well in the washers, was much less efficient in the purifiers. So far, no reason has been discovered for these differences. As showing the stages of removal of carbonic acid as the gas passes through the washers and purifiers, the following figures are quoted: Crude gas, 18 p.ct. of carbonic acid; after washer No. 1, 16·2 p.ct.; after washer No. 2, 13·8 p.ct.; after purifier No. 1, 13·6 p.ct.; after purifier No. 2, 11 p.ct.; after purifier No. 3, 0·4 p.ct. The temperatures in the three purifiers were respectively 28°, 35°, and 46° C. In some cases the action of the lime in the purifier was so considerable that the temperature rose to 52° C.

In regard to the yield and quality of gas, an average production was 30 cb.m. per 100 kilos. [540 c.ft. per cwt.] of wood; each retort yielding 350 cb.m. [12,500 c.ft.] per twenty-four hours.

Analyses of the gas showed its composition to be: Carbonic acid, 1·4 p.ct.; benzol and unsaturated hydrocarbons, 3·9 p.ct.; oxygen, 0·7 p.ct.; carbonic oxide, 35·7 p.ct.; hydrogen, 36 p.ct.; methane, 20·3 p.ct.; nitrogen, 2 p.ct. In the absence of a calorimeter, the calorific power (calculated from analysis) was estimated at 4899 calories.

The experience of consumers has been that the wood gas differed very little in lighting and heating effect from that from coal. At a Red Cross Hospital, where gas was the only fuel used, readings of the meters were taken each week by the company, and showed that the consumption of gas per person per day was exactly the same as when coal gas was burnt in the same appliances. Though consumers at first generally expressed the view that the wood gas would be deficient in heating power, they speedily realized that this was not the case.

The wood tar produced is of two distinct kinds. That condensing quickly is of a highly tenacious and viscous nature, though containing about 15 p.ct. of water. After getting rid of the water, a pitch results of such consistency as to command a sale among dealers in ship-building goods. The yield is about 1 p.ct. of this hard tar. The second description of tar, although more fluid, adheres strongly to the sides of its containing vessel. On distillation, it behaves somewhat peculiarly—breaking-up sharply into three fractions. The first of these fractions comes over at an almost constant temperature of about 92° C. Approximately a third of it is an oil of dense appearance, but of almost exactly the same specific gravity as the aqueous liquid mixed with it. The quantity of this fraction varies greatly; some tars yielding twice as much of it as others. Both the watery and oily portions of it are first of a light reddish colour, but quickly become dark brown on exposure to the air—no doubt as the result of the presence of pyrogallic acid. The whole of this more fluid tar has been requisitioned by the Italian Government, although it contains very little benzol.

The second fraction, coming over at from 130° to 195° C. and then fairly steadily at 188° C., is of clear brown colour, with a much less penetrating odour than the first. The oil obtained at from 130° to 195° C. is heavier than water; and like that from the first fraction, it becomes deep brown on exposure to light and air.

The residue is a hard pitch, almost identical with that from the heavier tar. The aqueous liquids distilling with the tar have a strong acid reaction, due evidently to considerable quantities of acetic acid. The quantity has not, however, been determined, nor have any steps been taken to recover the acid in the crude or pure state, as it was not considered wise to make the outlay on equipment for operations which, it was fully hoped, would be temporary.

In regard to the use of wood as the fuel for the retort-furnaces, it was found that the required temperature was readily attained—in fact, attention was necessary to avoid too high a temperature. About 1800 kilos [3960 lbs.] of wood were burnt per twenty-four hours, sufficing for the distillation of 6000 kilos [13,230 lbs.] of wood. The fuel ratio is, therefore, not at all bad; while the wood ashes constitute another bye-product which is readily sold. Altogether in the distillation of wood, as in that of coal, there are no waste products. And M. Rothenbach's experience, as declared to his Swiss colleagues, leads him to the recommendation that in the critical position in which many small gas-works find themselves as regards supplies of coal, recourse may with success be had to wood in places where it can be had in plenty.

CONDITIONS OF THE FORMATION OF COKE.

An abstract appears in the "Journal of the Society of Chemical Industry" of a paper in the "Comptes Rendus," Vol. 164, pp. 906-8, by Messrs. G. Charpy and M. Godchot, who describe a method for studying the coking properties of coals quantitatively, and also the influence of temperature on the coking process.

The coal under test is powdered to pass a sieve of 120 meshes, and exposed to an atmosphere saturated with water vapour and at 18° to 20° C., so as to define the humidity of the sample. The powder, compressed under a pressure of 5 kilos. per sq. cm., is filled into a tube of fire-clay, which is securely closed at the ends with iron plates. The tube and contents are introduced into an electrically heated furnace of such dimensions that the temperature is not thereby appreciably depressed. Heating is continued an hour. The coke is produced in the form of a cylinder, 12 mm. in diameter and 20 mm. in height, which can readily be subjected to a compression test, the result of which is taken as a measure of the quality of the coke produced.

The results of experiments on three kinds of coal at different temperatures are given. The compressive strengths, in kilos. per sq. cm., are the mean values of six determinations, the extreme values of which are given in brackets:

Coking Temperature.	St. Eloy Coal.	Ferrières Coal.	Noyant Coal.
650° C.	19·85 (17, 22)	19·0 (17, 21)	100·0 (94, 105)
800° C.	32·90 (29, 36)	30·5 (21, 34)	93·6 (90, 98)
1000° C.	38·70 (35, 42)	45·0 (42, 49)	36·3 (33, 39)

The variations with temperature are thus much greater than the experimental error, and are not, it is interesting to note, always in the same direction.

On modifying the methods of heating, other changes are produced. Thus the Noyant coal, if heated for a time at 650° C. followed by a gradual rise of temperature to 1000 C., gives a coke having a compressive strength of 130 kilos. per sq. cm.; while the coke from the St. Eloy coal is not appreciably improved by the same treatment.

The authors advocate the determination for each coal of the thermal treatment which leads to the best results in the coke.

Government to Take Possession of Lead.—The Minister of Munitions gives notice of his intention to take possession, as from the 1st inst. until further notice, of all pig lead, whether virgin or remelted, old and scrap lead, and lead residues, situated in the United Kingdom, excepting all such lead as may be in the possession of, or due under an existing lawful contract in writing for future delivery to, a manufacturer for use in such manufacturer's own works, and all such lead as may be specially excepted under the written authority of the Minister of Munitions. The lead of which possession is thus taken will be paid for by the Minister of Munitions on delivery.

The Gas-Turbine.—For large powers, the turbine possesses many advantages over the reciprocating engine (such as small floor space, light weight, and even turning moment); it is also generally recognized that internal combustion is more economical than steam. One objection to a gas-turbine is that the temperature of the resultant gases would be destructive to the blades; but an experimental machine is an accomplished fact. A 1000 H.P. gas-turbine built in Germany in 1914 gave trouble in valve action; and the whole of the explosion chambers could not be used. In the ordinary gas-engine, the cylinder is a combined explosion and power chamber; but these functions are separated in an impulse gas-turbine. Ten pear-shaped explosion chambers are grouped regularly round the shaft, each fitted with entry and exit valves; and the operation is similar to that of a two-cycle gas-engine. Air is forced into each chamber in turn, followed by gas also under pressure; and when liquid fuels are employed, a spraying apparatus worked by compressed air is used. When the correct proportions have been attained, the mixture is fired by electric sparks passing between contacts; and combustion is followed by a rise in temperature and pressure. The hot gases escape from the outlet-valve through a conical nozzle, and the cooled and expanded gases impinge on the rotor, being assisted by a fan on the exhaust. After the pressure is spent, a blast of air scavenges the explosion chamber; the time being longer than in the reciprocating engine, and the result more satisfactory. The cycle is then repeated. The exhaust gases raise steam for supplying the fan, the air and gas pumps, and the producer.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Wandsworth Meeting and the Sliding-Scale.

SIR,—May I ask you to explain to your readers that I did not use the words you attribute to me as "in effect," but with quotation commas, "What are we to do?"

It is not in your usual fair spirit to print the words as if really spoken.

HY. E. JONES.

13, *Queen Anne's Gate, S.W., Sept.* 7, 1917.

[To those of our readers who do not appreciate that when the words "in effect" are used they signify, not that the words quoted are exactly those employed by (in this case) the speaker, but are a paraphrase or the "effect" of what was said, we are pleased to explain that the esteemed President of the National Gas Council did not use the precise words as we gave them. What he actually said, after Mr. Allard had spoken at the Wandsworth meeting, was: "What direction should the movement take? There is a great deal of criticism. But you would help me very much, as I am connected with the National Gas Council, by indicating the particular shape in which you would like this to go forward. I did not rise to make another speech, but you know you must put some tangible proposition forward." Those are practically the words that appeared in the third person report of the proceedings at the meeting as published last week. Upon the inquiry put to Mr. Allard, upon the reference to criticism, and upon the suggestion that the President would be helped very much by an indication of the particular shape in which the speaker would like the matter to go forward, we wrote: "But what can we do?" in effect asks the President. "It is all very well to criticize, but what would you suggest should be done?" Really we do not see anything in this which can be described as unfair. If any reader thinks otherwise with the facts before him, we shall be more sorry for that reader than for anything we have said in this particular connection.—ED. G. J.]

Low-Temperature Carbonization.

SIR,—I have read your correspondent's letter signed "Notanda;" and I should have been pleased to answer his questions, but I have made it a rule, from which I do not intend to depart, not to enter into correspondence without knowing at least the name of the person requiring information.

The chief object of my letter to you was to show by definite proof that the instructions in the circular of the Ministry of Munitions could not possibly be carried out successfully by any endeavour to increase the output of tar by reducing the temperature of carbonization. I believe that this fact is now universally acknowledged by all practical gas engineers.

I have already stated that I will make the results of our experiment public in due course, when some of the questions asked by your correspondent "Notanda" may be answered.

JOHN WEST.

Southport, Sept. 6, 1917.

[There are, we know, good reasons for the identity of "Notanda," in view of his references to the National Gas Council, remaining within our confidence. This, however, may be said, that he is not commercially associated with any system of carbonization (high or low temperature), though concerned in the practical working of high-temperature settings.—ED. G. J.]

The Counsel of the Council.

SIR,—In a state of turmoil and anxiety, I wrote a letter to you on Aug. 22 asking certain questions, and urgently pressing for some advice and guidance from the National Gas Council respecting their circular on low-temperature carbonization. But up to the present, I have not heard from them or seen a line on the subject in your columns emanating from them.

Many thanks, however, to you, Sir, for endeavouring to enlighten us again upon the subject; also to Mr. John West, the veteran scientific and practical engineer, who gives us all some exceptional facts and figures most suitable to our case and present pressing requirement. The writer personally thanks him for his very timely information and solid practical advice; and he is sure that all representatives of gas undertakings will also thank him for championing their cause in such a bold, conclusive, and reliable manner. As you say in your leading article, the facts that he presents are unanswerable.

Then in your issue of the 4th inst., there is found a letter from Mr. Blundell, of Macclesfield, giving the results of his daily working, which certainly confirm once again all that you, Sir, and Mr. West have said on this very important question; and Mr. Blundell, like most of us, wants to know who is responsible for all this blundering.

The writer can now enlighten you somewhat, as all the questions he asked in his letter have been answered. He met a member of the National Gas Council this week who was at the meeting when the decision was made to send out the noted circular from the Ministry of Munitions. He said that after the delegates from the Ministry had interviewed the Committee, the circular was immediately rushed through without many of the members having any opportunity of carefully considering such an important question. But one is led to wonder why the gas engineers present did not give the Chairman some sound, practical advice on such a vital subject. Then after a few days a form was issued by the Council asking a number of extraordinary questions that no engineers could answer from their technical experience. There seems to be something that requires investigation in the rumoured and the printed revelations concerning this matter.

As for the writer himself, you know that he has been doing his best towards helping to win the war; and he will certainly continue to do so (not by low-temperature carbonization as laid down in the fatal circular) but certainly on the counsel of our old veteran who advises managers to work at as high temperature as possible, so as to enable their undertakings to pay their dividends and, at the same time, to increase their output volume of both gas and tar.

A GAS ENGINEER WHO CAN NOW DO WITHOUT ANY ADVICE FROM THE NATIONAL GAS COUNCIL.

Sept. 6, 1917.

Preventing Naphthalene Stoppages in Mains.

SIR,—I would be very grateful if any of your readers, through your columns, could kindly give information of methods they have successfully employed on the district to evaporate the naphthalene solvent on their line of mains—such methods being independent of anything employed on the works.

ENQUIRER.

Sept. 6, 1917.

REGISTER OF PATENTS.

Gas-Heated Soldering Iron.—No. 108,051.

TILLEY, F. C., of Kingsland Road, N.E.

No. 11,662; Aug. 17, 1916.

In this gas-heated soldering iron "the bit can be readily removed and a new one substituted, a better combustion of gas is ensured (consequently a greater heating effect therefrom is obtained), and the handle is kept much cooler than with those at present constructed."

The patentee claims a gas-heated soldering iron comprising an air-tube having holes for the entrance of air; a gas-tube having a nipple and positioned within the air-tube and held therein by a star or open wheel at one end and a screw nut at the other; a handle surrounding the air-tube and held thereto; a tubular mixing-chamber connected to the air-tube; a tube having a holed flange connected to the tubular mixing-chamber and carrying the nozzle; a hollow bit having a flanged end; and a screw-threaded collar engaging the bit and the holed flange of the tube to secure the bit in place.

Manipulating the Doors of Ovens, Furnaces, &c. No. 108,236.

BLYTHE, E., and ARMITAGE, C., of Dewsbury.

No. 13,728; Sept. 27, 1916.

This invention relates more particularly to apparatus for manipulating the doors of bye-product coke-ovens; but it may serve in applying the quencher to such ovens after the removal of the doors, or for manipulating the doors of other ovens, furnaces, or the like.

The apparatus is mounted upon a truck travelling on rails over the top of the oven doors—being prevented from tilting during operation. A further truck or bogey travels within the main truck, having its movement and position controlled by chains, chain wheels, shafts, and a lever. Mounted upon the bogey is a gantry supporting a moveable carriage from which is suspended a screwed hook-bolt connected by chain with the eye-bolt of the oven door. This carriage is also moved and controlled upon the gantry by a chain, chain wheels, and a hand lever. By operating the screwed bolt, the door is raised sufficiently off its bearing to permit of its transportation, which is effected by the carriage being moved outwardly upon the gantry carrying the door with it until the latter is past the customary buck-stays and gas-pipes of the oven. It is then moved horizontally and transversely by the movement of the bogey along its track within the main truck, as before-mentioned—bringing the suspended door opposite the door of the next oven, where it may be allowed to remain pending the discharge of coke from the opened retort.

Compositions Containing Pitch or Solid Tar Products.—No. 108,368.

DAVIES, G. L., of High Holborn, W.C.

No. 11,551; Aug. 15, 1916.

This invention has reference particularly to the treatment of the solid of very viscous tar products obtained by the process described in patent No. 16,908 of 1909. The object aimed at is to provide a composition consisting of tar products and solvents which can be utilized with little heat, or without the application of heat at all by dissolving the solid tar products obtained in the prior process referred to in cresols or a mixture of cresols and tar naphthas, and by these means obtain liquid or plastic compositions whose viscosity depends upon the relative proportions of the tar products and solvents employed.

The preferred solution consists of 90 p.ct. of tar naphtha and 10 p.ct. of cresylic acid; and an effective roofing composition consists of 50 p.ct. of the solid tar product, 45 p.ct. of tar naphtha, and 5 p.ct. of cresylic acid. These compositions can be easily applied to the roof of huts, fences, or the like, and when the volatile solvents have evaporated the tar products are left as a hard protective surface, which will be weather-proof and durable.

Gas-Heating Stoves.—No. 108,500.

FLEISCHER, J., of Stuttgart, and HAEGELE & ZWEIGLE, of Esslingen on the Neckar, Germany.

No. 10,190; July 19, 1916.

This is a modification of patent No. 100,114 "comprising three groups of heating tubes lying one behind the other." Owing (say) to lack of space these stoves cannot always be conveniently accommodated; and the main feature of the present improvements consists in "a rearrangement of the three groups of heating tubes side by side in a single row thereby constituting a one-rowed stove of the same heating effect, which can be erected in position where the available space is limited." Other improved features include the special formation and the jointing or seaming of the heating tubes, and the provision of means for leading off condensation water.

Gas-Burners.—No. 108,502.

TURNER, E., of Urmston, near Manchester.

No. 10,595; Jan. 29, 1917.

These gas-burners are of the multiple burner orifice type, in which the gas is led to an inner chamber, whence it issues from outlets (distributed over its area) into a second chamber, provided with burner orifices, so as to maintain a substantially even pressure at all the burner orifices or nozzles; the object of the invention being to provide for the regulating of the pressure along the length of the burner.

Such burners, the patentee states, are usually of tubular formation; and, according to his invention, the inner casing is movably mounted within the outer casing—the construction and arrangement being such that the position of the outlet orifices in the inner casing can be varied relatively to a blank surface in the outer casing, whereby the back-pressure on the orifices, or a portion of them, may be varied, so as to vary the rate of flow of the combustible mixture through the orifices.

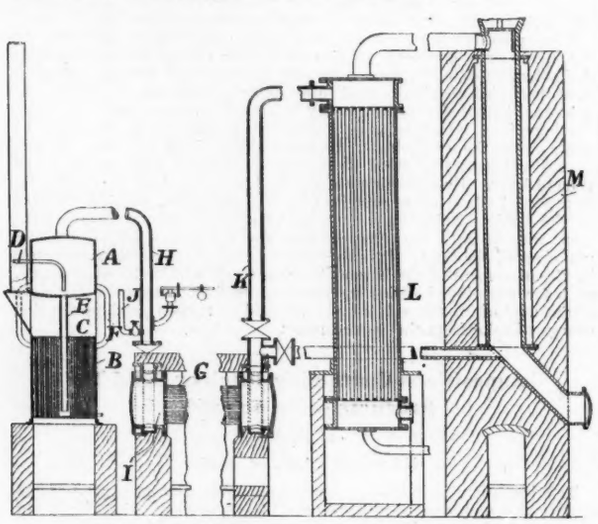
Production of Toluol, Benzol and Other Light Hydrocarbons from Heavy Oils.—No. 108,508.

ANDERSON, W., of Helensburgh, and MEIKLE, J., of Maryhill, Glasgow.

No. 11,033; Aug. 4, 1916.

This invention relates to apparatus for obtaining toluol, benzol, and other light hydrocarbons from heavy or dead-oils, such as creosote oil or blast-furnace oil, by distillation of the oil under pressure, followed by transference of the vapour obtained by distillation to a superheater, and superheating it along with steam—"the decomposition being the consequence of superheat, as distinguished from reaction in the presence of a catalyst."

In practice, the oil is first subjected to distillation under pressure—say, upwards of 10 lbs. per square inch above atmospheric pressure. The distillate, still under pressure, is transferred to a superheater, and superheated along with steam; the superheater being maintained at a temperature of about 1000° Fahr., so that the vapours are decomposed into various compounds, consisting principally of toluol, benzol, and their homologues. The condensible constituents may then be collected in a condenser at atmospheric or sub-atmospheric pressure.



Anderson and Meikle's Hydrocarbon Recovery Plant.

The apparatus (as shown) comprises a still constituted by superposed drums A B separated by a combustion chamber C. The lower drum is traversed by fire tubes—a downcomer E being led from the upper drum to the lower end of the lower drum, preferably centrally of the drums. Return tubes F connect the upper end of the lower drum with the lower end of the upper drum. The feed pipe D is preferably coaxial with E. The superheater connected to the drum A by a pipe H, and coupled to a steam supply pipe J, is constituted by tubes G expanded into headers I. As is evident, steam is thus admitted to the superheater together with the oil vapour from the still. The superheater has also a connection K with the condenser L. M denotes a retort to which the vapours from the superheater may be led, as described in the following patent, No. 11,034.

Carbonization of Coal.—No. 108,509.

ANDERSON, W., of Helensburgh, and MEIKLE, J., of Maryhill, Glasgow.

No. 11,034; Aug. 4, 1916.

This invention relates to apparatus for carbonizing coal and other carbonaceous matter, by retorting it in the presence of hydrocarbon vapour at a high temperature—an operation effected as described in the above patent, No. 108,508.

Referring to the illustration there given, the retort M is interposed in a bye-pass connection between the condenser L and the superheater, comprising tubes G expanded into headers I, through which are led the steam and distillation products from the still provided with the oil inlet D—there being preferably introduced an expansion chamber between the retort and the condenser L to receive the heavier hydrocarbons and tarry matter.

While part of the total volume of vapour emerging from the retort will condense in the condenser, the residual gas will be available for the same uses as coal gas, and the carbonized product "will be of high value."

Gas-Cooking Stoves and Ranges.—No. 108,518.

NEWELL, O., and O'BYRNE, P., of Dublin.

No. 11,174; Aug. 8, 1916.

This invention relates more particularly to that already-known kind of appliance consisting of a metal ring or band for placing on the stove so as to concentrate the heat of the burners on to the bottom of the cooking utensils and thus increase the heating capacity of the stove and correspondingly decrease the consumption of gas.

Heretofore the rings or bands have been made of flat metal strips, and the present "invention" consists in making them with corrugations across their width. The ends of the metal strip lap over one another so that the size of the ring will accommodate (within certain limits) utensils of more than one size; the ends of the strips being retained in position by a bolt passing through one of a number of holes provided in the ring.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 5.]

Nos. 12,237—12,595.

ALLEN, E.—"Flexible containers for transport or storing of gas. No. 12,528.

BRITISH RUBBER MANUFACTURES, LTD.—"Gas-containers and connections for adapting engines of automobiles for drive by coal gas, &c." No. 12,589.

BROWN, J. H.—"Drying, purifying, &c., air and gases and oils and other liquids." No. 12,560.

BURNS, H. A.—"Separation of suspended particles from gases." No. 12,281.

CHILTON, A. H.—"Gas apparatus and utensils for cooking and heating." No. 12,392.

COLE, E. G.—See Allen. No. 12,528.

GIDDEN, W. T.—"Process for purifying trinitrotoluene." No. 12,282.

LONDON GENERAL OMNIBUS COMPANY.—"Storage systems for supply of gas to internal-combustion engines." No. 12,542.

MOORE, F. W.—"Storing gases." No. 12,444.

NITROGEN PRODUCTS & CARBIDE COMPANY.—"Destructive distillation of carbonaceous materials to increase aromatic bye-products thereof." No. 12,350.

PERKIN, F. M.—See Nitrogen Products Company. No. 12,350.

POLLITT, A.—"Apparatus for power, propulsion, and lighting by high-pressure gas." No. 12,467.

REEVES, J. W.—See British Rubber Manufactures. No. 12,589.

SCHROEDER, F. W.—"Incandescent gas-burners." No. 12,293.

SHAVE, G. J.—See London General Omnibus Company. No. 12,542.

SHORT, F. C.—See Moore. No. 12,444.

SIMON-CARVES, LTD.—See Brown. No. 12,560.

SINGER, L.—"Process for removal of tarry matter from ammonium salts." No. 12,547.

SINGER, L.—"Removal of sulphuric acid, tarry substances, &c., from gases." No. 12,549.

SPENCER, A. C.—See Allen. No. 12,528.

WHYMAN, A.—See Pollitt. No. 12,467.

The Directors of the Alliance and Dublin Consumers' Gas Company have declared a dividend at the rate of 4⅜ p.ct. per annum, or 4s. 4½d. per £10 share, as compared with 5½ p.ct., or 5s. 1½d. per share, last year.

The women engaged on the Products Plant at the Old Kent Road works of the South Metropolitan Gas Company last month entertained a hundred wounded soldiers in the Livesey Institute. An excellent programme had been arranged, one item of which was a substantial tea; and photographs taken on the occasion which appear in the current issue of the "Co-Partnership Journal" will be a valued memento for those who participated in it of a very enjoyable afternoon.

MISCELLANEOUS NEWS.

COAL FACTORS' PRICES.

Board of Trade Order.

The following is the text of an Order issued last week by the Board of Trade, and to be known as "The Wholesale Coal Prices Order, 1917."

In exercise of the powers conferred upon them by Regulations 2 (F) to 2 (JJ) of the Defence of the Realm Regulations and of all other powers enabling them in that behalf, the Board of Trade hereby order as follows:

1. The price at which a factor or merchant may sell coal in railway wagon or barge load or cargo to a consumer or to a retail coal merchant for re-sale by him from depôt or wharf or railway siding by retail to consumers or to hawkers or small dealers, shall, except as hereunder provided, not exceed the pit price chargeable by the owner of the mine at which the coal was produced, or in the case of washed fuel, the price chargeable for the fuel at the washery by the owner of the fuel by whom, or on whose behalf it was washed, in addition to the actual cost of transport (in which cost no charge shall be made by the seller of the coal in respect of office expenses, salaries, or other overhead charges or loss in handling) by more than the following amounts:

(*a*) Coal purchased by railway companies in Great Britain for consumption on locomotives 3d. per ton.
(*b*) Coal purchased by railway companies in Great Britain for other purposes ... ... 6d. ,,
(*c*) Coal consumed in national factories ... ... 6d. ,,
(*d*) Coal consumed in gas and electric supply undertakings in Great Britain ... ... 9d. ,,
(*e*) Coal sold to retail merchants in Great Britain for re-sale by them from depôt or wharf or railway siding by retail to consumers or to hawkers and small dealers ... ... 1s. ,,
(*f*) All other coal, including all coal sold for consumption in Ireland, 1s. 3d. per ton, except that where coal sold direct to a consumer not having rail or wharf accommodation, who makes his own cartage arrangements, is delivered in railway wagon by the factor or merchant in quantities less than 30 tons, the amount chargeable in addition to the price at pit or washery and the transport charges as above defined shall be 2s. per ton, unless the consumer has ordered not less than 500 tons of the coal in question for delivery over the following twelve months.

Provided that:

(i) Where coal is dealt with by more than one factor or merchant before reaching the consumer or retail merchant, the above amounts of 3d., 6d., 9d., 1s., 1s. 3d., or 2s. per ton respectively shall be divisible between the different factors and merchants; and each seller, except in the case of the final sale to the consumer or retail merchant, shall at the time of the sale inform the purchaser how much of the above amounts is included in the price, in order that the maximum price may not be exceeded.
(ii) In the case of washed fuel, where loss of weight in transit is borne by the factor or merchant, a charge may be made by the factor or merchant in respect of such loss by way of addition to the price per ton at which the fuel is sold to the consumer, not exceeding in any case 2 p.ct. of such price.
(iii) Where the seller himself provides water transport, otherwise than by the charter of a ship subsequent to the date of this Order, the transport charges shall not exceed the rate current at the date of this Order.
(iv) Where payment is not made by the consumer or retail merchant before the date on which payment is due to the original owner of the coal or within thirty days of delivery of the coal (whichever is the later), the factor or wholesale merchant may make a reasonable charge in respect of credit to the consumer or retail merchant.

Provided also that the maximum charges specified in this article, including the transport charges, may be increased or reduced by the Board of Trade, either

(*a*) Generally.
(*b*) As respects any particular class of business.
(*c*) As respects the business of any individual factor, merchant, or consumer.
(*d*) As respects any individual contract or sale.

2. All contracts for the purchase or sale of coal in the United Kingdom under which deliveries were being made or were due prior to the 10th of September, 1917, are hereby abrogated. Provided that, notwithstanding such abrogation, the seller shall, subject to any instructions which have been or may be given by or on behalf of the Controller of Coal Mines under the Coal Transport Order, 1917, or otherwise, continue to deliver to the purchaser, and the purchaser shall continue to receive, the coal during the period of the currency of the contract, and under the conditions and at the rates specified thereunder, unless otherwise agreed by both parties; and the price charged as from the 10th of September shall not exceed the price chargeable under the contract in accordance with the provisions of the Price of Coal (Limitation) Act and of this Order. Provided also that in no case shall the price be increased without the consent of the Controller of Coal Mines for the time being appointed by the Board of Trade, hereinafter referred to as the Controller.

Any party to such contract may apply to the Controller for the variation of or relief against any term or condition of such contract; and such application shall be heard and determined by the Controller in the same manner as any question may be determined under Article 6 of this Order, and that article shall apply accordingly.

3. If, in consequence of the provisions of Article 2 hereof, the price to be paid by any person to whom coal is delivered is reduced by any amount, the price to be paid by any person to whom the coal is delivered in pursuance of any subsidiary contract shall be reduced by an equivalent amount, unless the Controller otherwise orders.

4. This Order shall not apply to any sale of coal for export, or any sale of coal for the manufacture of patent fuel for export, or any sale of coal to be used on any ship.

5. No person shall sell or buy or offer to sell or buy any coal at a price exceeding the maximum price hereby fixed.

6. Where any dispute or difference arises between two or more factors or merchants as to the division of the amounts referred to in sub-paragraph (i) of Article 1 of this Order, such dispute or difference shall be referred to the Controller.

The Controller on such reference shall consider the cases of the respective parties and take their evidence in such manner as he shall deem most convenient, but shall give each party an opportunity of knowing and answering his opponent's case.

If the Controller deems it desirable to hear the parties *vivâ voce*, he may appoint a person to hear the evidence and arguments and report to him. The decision of the Controller shall be final and binding on all parties to the reference; and the Arbitration Act, 1889, shall not apply thereto.

7. If any person acts in contravention of this Order, or aids or abets any other person in doing anything in contravention of this Order, that person is guilty of a summary offence against the Defence of the Realm Regulations; and if such person is a corporation or company every director and officer of the corporation or company is guilty of the like offence, unless he proves that the contravention took place without his knowledge or consent.

8. The Controller shall be responsible to, and is hereby authorized by the Board of Trade to take all measures that are needed to give effect to this Order. He may suspend from time to time and for any period, and in any district or part of a district, the operation of all or any of the articles of this Order or parts thereof as he thinks fit, and may restore such operation. He may make such rules, and issue such instructions under this Order, as may be necessary to give effect to its provisions; and such rules and instructions shall be deemed to be part of this Order, and shall have the same effect as if they had been included in this Order.

9. (*a*) This Order may be cited as the Wholesale Coal Prices Order, 1917.
(*b*) This Order shall take effect as from the 10th day of September, 1917.

Signed on behalf of the Board of Trade, 5th day of September, 1917.

W. F. MARWOOD,
A Secretary of the Board of Trade.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held on Friday, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E., the Chairman, presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the report and statement of accounts were taken as read.

THE CHAIRMAN'S VIEWS.

The CHAIRMAN, in moving the adoption of the report and accounts, said the statement presented that day was one rather indicative of difficulties withstood than of success achieved. From the report it would be seen that there had been an unprecedented increase in the Company's business. On this they could congratulate themselves in one sense; but he need not tell them that such an abnormal increase in responsibilities in these days was something that brought with it a large amount of superadded difficulty and embarrassment. It was to be hoped that the business thus acquired would remain to them in great degree when the war was done with. It was also stated that the increase in the price of gas that had been forced upon them would reflect itself in a further reduction of 1 p.ct. per annum in the dividend for the half year to next December.

THE ACCOUNTS.

The total capital receipts amounted to £703,378. The capital per million c.ft. of gas sold stood as low as £446—the lowest figure it had ever reached. This was the one factor which had helped them to limit their misfortunes up to the present. In 1907, it stood at £600; and if they had had to deal with any such figure as that now, their case would have been vastly worse. This capital figure had been reduced in two ways—by the increase in the business and by the adventitious aid of the capital redemption powers, by which they purchased and extinguished their own stock. The latter provision did not associate itself with war circumstances, and so was in abeyance for the time being. The total amount by which they had increased the price of gas was 10d. per 1000 c.ft., from 2s. 8d. before the war to 3s. 6d. now. This was an increase of 31 p.ct. in the demand upon the consumer. On looking at the other side of the account, the fact transpired that the cost of coal had increased since the war by 125 p.ct. He was not even sure that this would be the limit of the fully-developed coal prices for the current half year. In so far as they might use oil, this commodity had increased by nearly 400 p.ct. The increased return from residuals was in nothing like *pro ratâ* relationship. The price of coke to-day was largely regulated by the operations of companies whose coal was costing only 50 p.ct. beyond what it did before the war. While their receipts had been over £27,000 more, the expenditure had risen £34,000; the profit being decreased by £7324. It had not been possible to maintain in these adverse circumstances the high figure for depreciation and maintenance which had characterized their accounts in the past. But the essential duties in these ways had been performed; and they were maintaining the degree of efficiency which would prevent them contracting liabilities as they went forward. In the profit and loss account, it would be seen that there was brought into account £38,726; and the profit for the past half year amounted to £18,977. After deduction of interest, income-tax, and dividend, the sum carried

forward was £31,803, which was a decrease on the amount brought in of £6923.

THE EFFECT OF A LOW STANDARD PRICE.

With regard to the current half year, this state of affairs would be met by the increase in the price of gas of 4d. per 1000 c.ft. from July 1, and by the wholly disproportionate sacrifice of the proprietors' dividend which the Directors could not avoid. This situation was really due to the fact that they had an improperly low standard price attached to the working of the sliding-scale. It was interesting to look and see how and why the standard price had been fixed in the past in regard to the sliding-scale. Having had a fair amount of both administrative experience and parliamentary argument in the matter, he thought he might put it shortly that the standard price was fixed by Parliament in the past at such a figure in relation to the cost of producing gas as would secure to the proprietor a reasonable expectancy of the standard dividend, while giving the administration of gas undertakings an inducement to add to this dividend by reducing the price of gas. But the first object in the mind of Parliament was to secure the standard dividend against everything but bad management. In the case of maximum dividends, the maximum price was put at a figure more distant from the reasonable selling price, because there was no expectancy of added dividends. It was perfectly obvious from this that the successful operation of the sliding-scale depended upon a fair standard price; and, as he had said, this standard was calculated upon what a company ought to be able to sell gas at under ordinary trading circumstances. If this were so, it certainly followed that, if the circumstances upon which this price was based were arbitrarily disturbed or destroyed, there were grounds for a demand for a readjustment of the standard to meet these destructive factors.

THE BURDEN OF SEA-BORNE COAL.

In fixing the price, Parliament were actuated by certain considerations. In setting the price for a small company, they gave them a reasonably high standard. In arranging the figure for a company dependent upon rail-borne coal, and not enjoying the then advantages of water-carriage, they gave them a higher standard price, because it was concluded that the balance of trading was in favour of those who had the water-way and the water freight to help them. Now, look at the subversion of conditions that had occurred. Those dependent upon rail-borne coal to-day had had to face a 50 p.ct. increase in the cost of their coal; while those dependent upon water-borne coal, by reason of which facility their standard price was put low, had been confronted with an increase of 150 p.ct. on their coal cost. Such a disturbance of the basis upon which Parliament granted the sliding-scale was a complete reason for its revision, if none other existed; for it was simply the misfortune of this most unfortunate war that a burden three times as heavy as on the others should have fallen upon those whom Parliament thought would in future be trading under the more favourable conditions. The different standard prices fixed for companies topographically close together, showed that there was a strong case for the revision of the sliding-scale, if anything like a universal and equitable application of the principle was to be established.

THE CHAIRMAN'S SUGGESTION.

It might be said that it was all very well to complain of these things, but had one any practical suggestion to make? Emphatically, he had. He would make the same suggestion as he had put forward some months ago through the Press, which he thought both practicable and reasonable. He meant that Parliament should be asked through the proper channel to establish a tribunal to consider the cases of extreme hardship that existed at the present time, and that they should be empowered to grant a neutral zone not exceeding 4d. above the standard price, so as to preserve the standard dividend. He never thought for one moment that the Company should not make some sacrifice. He was always clearly of opinion that the dividend above the standard rate would have to go; but he could not see why they should fall below the standard rate, when the gas industry at the present time was performing such huge service to the country, with great sacrifice in other ways. He utterly failed to see that practical difficulties existed in the way of giving effect to this. It was nothing like so complicated a matter as dealing with the calorific standard. There would not be so many undertakings to deal with. A great many companies had their standard so high that they would not need to trouble the tribunal at all; many were maximum companies, and in most cases protected by the larger margin afforded to such concerns; and there were many which were owned by municipalities. The dimensions of the parliamentary labour involved would thus be extremely small. He ventured to think immediate action was desirable; and this opinion was shared by those possessing a greater experience of parliamentary procedure than he himself had. They did not want to look forward to compensation for losses, if by immediate treatment they could get relief from what was an intolerable grievance. There were, he knew, difficulties in the way. He ventured through the Technical Press—and no industry had been better served by its Technical Press through all these troubled three years than the gas industry—to draw attention to the subject. The leading publication well and intelligently ventilated the matter; and then the first difficulty disclosed itself. There were intemperate and ill-considered views expressed that the whole of the extra dividend should be preserved by some such process as he had suggested, and that the shareholders should not make any sacrifice. To suggest that they should ask Parliament to preserve all the extra dividend seemed to him to convey the idea that, instead of seeking redress, they were anxious for the facilities of the profiteer; and he did not believe it would receive consideration. So the proposal was vitiated in its inception by these ill-considered and intemperate claims. The next great difficulty—and it was a very real one—was that Parliament would not be disposed to deal with this question if the big Metropolitan companies were excluded from such treatment. The sliding-scale had its inception in the Metropolis; and the Company that perhaps exemplified to the fullest possible extent the position of the sliding-scale was the largest in the world. Unless the latter could support some such application, it would materially detract from the claims of smaller undertakings who would be seeking relief. There was a third difficulty, which was that, in the darkest hour of their existence, the gas industry appeared to have no Association or Society capable of effectively presenting and urging its claims. It never wanted one more than at this moment; and such an organization was never more conspicuous by its absence. He understood that there was an organization; and he believed that members of the profession whose experience and talents would lead him to place the greatest confidence in them were not associated with it, or only nominally associated with it. On reading a description of this body, he saw it was to embrace commercial interests and municipal interests. Now, the commercial interests had their own troubles, and their own triumphs financially; and they were not likely to concern themselves with the matter he had in mind. Then as to the municipalities, if they were true to the interests with which they were identified, they would be hostile critics of any such movement as this, instead of sympathetic supporters. Therefore, he could not say that, when they most needed it, they had the body they should have—and in a certain modified degree did have some years ago—to look after their interests in this all-important matter.

THE EXPERIENCE OF AMERICA.

There were some dangers ahead. The sliding-scale undoubtedly was an ingenious and an effective method—effective principally in its special application to certain undertakings. In its comprehensive application he did not believe it was of any general value. He remembered some years ago a gentleman who came from the United States Government calling upon him and asking him to give him his views upon the sliding-scale. He did so, and having heard him the gentleman said he was very surprised, because he (Mr. Paddon) was the only person with whom he had spoken who did not enthusiastically applaud the principle of the sliding-scale. He (the Chairman) replied that he preferred the maximum principle. A little later he received a copy of this gentleman's report, and heard that on the strength of it the sliding-scale had been adopted in America. However, quite recently he had seen that those who had adopted it were cursing it "by bell and book," and taking the necessary measures to be free of it. When a principle was adopted upon mature consideration, it must have something wrong with it in its application if it failed to satisfy those who had taken it up. He was not against the sliding-scale; he believed it to be a good principle. But it must be periodically considered and adjusted, or in a great exigency like this it would be apt to almost completely sacrifice the interest it was intended to safeguard—which was a standard dividend to the industry. If this hardship were not dealt with, there would be a revulsion of feeling with regard to the sliding-scale. Companies would seek to raise future capital under maximum powers, and a valuable principle under certain circumstances might be lost. Their own Company were feeling the full brunt of it. In these times, it was extremely difficult for them to organize any method of getting relief; but he had felt constrained to address himself to the subject, because of the correspondence he had received from proprietors, who expressed most profound dissatisfaction with the sliding-scale, and who were entitled to know why it was in this particular case their interests had suffered so severely from its operation.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the motion.

Mr. CHARLES WEBB remarked that there was a reserve fund of over £60,000; and he asked whether this was not intended to equalize the dividends. Many proprietors, he thought, would have welcomed the deferring for another six months of the increase of 4d. in the price of gas, and the taking of any deficiency from this reserve fund.

Mr. A. W. OKE said he had always been a warm advocate of the sliding-scale. He suggested that there should be some practical outcome of the Chairman's remarks, and that Mr. Paddon should get in touch with some other companies similarly situated, with a view, if possible, to the promotion of a Bill in Parliament to secure a neutral zone of 4d.

Mr. SAMUEL SPENCER expressed the hope that it might be found feasible to move in the matter.

Mr. W. A. HOUNSOM said they were very greatly indebted to the Board and the officials for all they had done. The circumstances of this Company were so special and so peculiarly adverse that the presenting of such an account as they had before them was a matter for thankfulness. The question to which the Chairman had been referring had, he thought, been approached rather too much from the shareholders' standpoint. The question should be taken up on the broadest possible lines. It should be considered, not only from the shareholders' point of view, but from that of the consumers and the employees.

The CHAIRMAN, in reply, said the reserve fund existed for the purpose of making up deficiencies in dividend. The only question in the minds of the Directors was how soon they should have recourse to it. On the present occasion they had taken a deficiency of over £7000 out of the carry-forward; and it did not seem to them that they should take a greater amount than practically one-third of the sum required from any form of reserve at any one time. With the low standard price they now had, there would be no probability in the future of being able to restore to the reserve fund what they took from it. As to Mr. Oke's remarks, adjustment in these special circumstances was necessary. He did not wish to assail the principle, but to make it applicable to the exigencies of the present situation. The change to the calorific standard was accompanied by the provision that it should be subject to revision at the end of five years; and he was perfectly willing that any change in the sliding-scale should be similarly liable to revision within a reasonable period—one year after the war, if desired. They only wanted temporary relief, and temporary adjustment. Whatever lay in his power to do, he would do. They had considered the matter from the shareholders' point of view, because it was the shareholder who had suffered.

The motion was then carried unanimously.

THE DIVIDENDS.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends were declared for the half year at the statutory rates per annum of 6 p.ct. on the "B" preference stock, 4 p.ct. on the "C" preference stock, 10 p.ct. on the original ordinary stock, and 7 p.ct. on the "A" ordinary stock.

The proceedings concluded with votes of thanks to the Chairman, Directors, Secretary, Engineer and General Manager (Mr. C. H. Rutter), and staff.

NORTH MIDDLESEX GAS COMPANY.

The Half-Yearly Meeting of the Company was held on Monday of last week, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E., the Chairman, presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, congratulated the proprietors on the character of the statement presented to them. It was, he said, rather surprising to find how the result of the war varied in its application to companies under very similar conditions. If there was a category of gas undertakings which had as a whole come through the ordeal well, it would be those in the suburban districts to the north of London, though there were, of course, exceptions to this rule. So far as their own Company were concerned, the proprietors' interests had suffered not at all up to the present moment. It would be found that the accounts would repay a little examination. In the first place, the capital per million cubic feet of gas sold stood at £637. This was a figure to which he always referred, because it was far and away the most important item of the accounts. It was owing to the fact that they had this very moderate amount of capital employed in the business, that the subsequent figures were so favourable. Very little had been spent on capital account in the six months ended June 30—not so much, indeed, as had been written-off in depreciation. This was a satisfactory feature in times like the present. Turning to the revenue account, it would have been noted from the report that there had been an increase of over 10 p.ct. in the sales of gas. This was quite as much as they had wanted. In fact, it would have embarassed them less, and served their financial ends equally well, if the increase had been only half this amount. Since the outbreak of war, the price of gas had been increased 5d. per 1000 c.ft., which was equivalent to a rise of 12 p.ct. in the charge made to the consumer. Coal alone had cost them, roughly speaking, since the beginning of the war, 50 p.ct. more; and for oil, were they compelled to buy it (which fortunately, having by the exercise of foresight accrued a considerable store, they were not), the increased cost at the present time would be about 500 p.ct. Everything else, too, had gone up; and it was therefore gratifying to reflect that, by merely charging the consumer 12 p.ct. more than before, the Directors were able to come forward with such an excellent statement as that now before the meeting. The unaccounted-for gas was just under 6 p.ct.; and as the district was not entirely urban, this might be regarded as satisfactory. The total receipts from gas and rental of meters, stoves, &c., were more by £4663, and residual products had brought in £1315 more. The gross receipts were £5977 up; the additional expenditure being £4298; and the extra profit £1679. These results had been achieved without any sacrifice of due and proper provision for maintenance. Allowances to dependants of employees serving with the forces had increased, as the proprietors would have expected, and no doubt wished. It was pointed out that the war items, including the fund for wounded soldiers, air-craft insurance, allowances to employees to meet the increased cost of food, and allowances to dependants, in the aggregate amounted to 3d. per 1000 c.ft. in the price of gas. As to the profit and loss account, they brought £2797 in, and they took £3208 forward, or an improvement of £231. But they had carried £1000 to the renewal fund. For income-tax and excess profits duty they had paid £825. It was impossible to estimate precisely what the increase in the business would be. The Board counted on a small one, and had had a large one; and its usual effect on the standing charges had made the Company liable for a payment of some £400 to the Government. The Directors did not propose to repeat this, and had decided to reduce the price of gas from Oct. 1 to ordinary consumers 1d. per 1000 c.ft. He hoped the result of this would be to effect such improved relations with the consumers—if that were possible—as would redound to the credit of the Company in the future, and help them when these troublous times had passed away. The balance-sheet showed that they were well placed with regard to available cash. With reference to the current half year, he did not see that the proprietors need have any very great anxiety. There had been difficulties in getting coal, mainly engendered by the large increase in the business; and there were problems with regard to the method of manufacture which would best meet the interests of the Government, consistently with carrying on the business of the Company efficiently and economically. He had known the gas industry for the last thirty years in almost every phase; but he never knew it with less guidance than it was getting to-day. Most of their problems they had to deal with by their own intelligence and their own experience. He was certainly very disappointed with the way in which, as a whole, the gas industry dealt with the different problems of manufacture with which it was confronted. Very often proposals and suggestions were made to them which to the mind of a practical man were really farcical. They were all actuated with a sincere desire to comply with the national requirements; and few people, even among the gas investing public, knew how much the country was dependent upon the gas industry to-day for the carrying on of the war. Their own Company had responded to every demand made upon them; but they were entirely governed in what they could do by the obtaining of the raw material. He hoped difficulties in this respect would not increase during the present half year; but it looked as though they would. The Directors had done all they could to ensure a good supply of coal.

Mr. H. A. LEBMITTE seconded the motion, which was carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. S. A. SAMPSON, dividends were declared for the half year, at the rate of 5 p.ct. per annum on the preference capital, 11 p.ct. per annum on the original ordinary capital, and £7 14s. p.ct. per annum on the additional ordinary capital, all less income-tax.

The CHAIRMAN, proposing a hearty vote of thanks to the officers, said the results of the Engineer and Manager (Mr. Lawrie Trewby) were uncommonly good. It was a pleasure to know that they had preserved harmonious relations with the employees.

Mr. JOSEPH CASH, in seconding, said the fuel account and the make of gas were satisfactory, and the profits were exceptionally good.

The vote was cordially passed, and acknowledged by Mr. BURTON and Mr. TREWBY.

The Chairman and Directors were similarly thanked, on the motion of Mr. F. R. SMITH, seconded by Mr. W. G. BEAUMONT.

HARROW AND STANMORE GAS COMPANY.

A Large Increase of Business.

The Ordinary Half-Yearly Meeting of this Company was held on Monday last week, at No. 5, Great Winchester Street, E.C.—Mr. A. F. PHILLIPS in the chair.

Mr. CHARLES CHAMBERS, the Engineer and Manager, read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the results of the half year might be considered satisfactory. The quantity of gas sold was 197 million cubic feet—an increase of 27 millions on the corresponding half year, which was equal to 16 p.ct. The increase in the Stanmore part of the district was phenomenal; being no less than 36 p.ct., and was in some measure accounted for by the consumption at works providing material for the war, which consumption was supplied at a reduced price. The larger part of the increase was, however, due to the ever-extending use of gas for cooking and heating. While 126 new consumers had been obtained, the Company had fixed 198 cooking-stoves, 176 gas-fires, and 25 circulating-boilers on hire, and might have fixed more had fitters been available to do the work. In reviewing the revenue account, he might say that, as expected, the expenses had risen, especially those for coal, oil, and labour. The Directors realized that the cost of living had increased, and endeavoured to meet it from time to time by allowances to the employees. They were not, however, sufficient to meet with the men's approval; and further allowances had recently been made, with which the men should now be content. These increases would in future add considerably to the labour bill. Ever since the war, the cost of labour and raw material had continued to increase; so that the additional expenditure was far more than was realized by the small addition of 2d. per 1000 c.ft. to the price of the gas. While every endeavour would be made by the Directors to avoid a further rise in the price of the gas, it was evident, if these expenses continued to grow, the Directors would have no alternative but to increase the price. In the capital account, there was a charge of £1586 for meters and stoves. It had been the policy of the Company to charge new meters and stoves to capital, and write them off at the rate of 10 p.ct. per annum. It would be seen from the accounts that the amount written-off in this way for the past half year was £1244 more than that charged. The capital consequently stood at £1244 less than it did on Dec. 31 last. The capital was now equal to £674 per million c.ft. of gas sold—a reduction on what it was a few years ago. It was, however, well to consider that, with the increases in the consumption of gas, some parts of the manufacturing plant required additions—a work that would have to be taken in hand as soon as the times permitted. The receipts for gas were £32,166, or an increase of £4295 on the previous half year. Meter and stove rents realized £4247—an increase of £338; and residuals, £8506, or £1118 more. In the half-year's expenditure, coal cost £14,243, which was an increase of £2673, owing to the additional cost of coal, and 1638 tons more having been carbonized. Oil cost £455 less, because the quantity used was 15,363 gallons less. Coke cost more, owing to its increased value. Repairs were £4802, which was £704 more, due to additions to the plant for benzol extraction, expenditure on the coke-conveyor, and the replacing of one of the exhausters. Rates and taxes were £318 less, because the income-tax was properly charged in profit and loss account, instead of the revenue account, as had been the practice of the Company since its formation. The war allowances to employees and war service payments were £1144, which was £512 more. The other expenses remained much the same, though there had been a more careful apportionment of some. The result of the half-year's working was a balance of £9653, against £8353 the corresponding half of the previous year. With the balance of £3656 brought from the last account, and adding this half-year's balance and £65 interest, and deducting the interest on debenture stock and loans and income-tax (£2049) left a disposable balance of £11,325. The dividends recommended would require £6772, leaving £4552 to carry forward. There had been no addition during the year to the price of gas, which was only raised 2d. per 1000 c.ft. in 1915. As the Company had not paid the maximum dividends to which the proprietors were entitled, the Directors were able to recommend the usual dividends, which had been earned. The increase in the consumption of gas, though much of it had been supplied at a low price had been the means of helping the Company to maintain its position without any further addition to the price. The benefit, however, was not so considerable as it might appear, because there must be an outlay of capital in extending the works to meet it; and it was probable after the war the consumption of gas at the works supplying materials for the war would be greatly reduced. The management had been successful in maintaining a satisfactory stock of coal; but oil had only been obtained with the greatest difficulty, and the stock was low. Keeping the works provided with coal to meet the requirements of the district received the constant attention of the Directors. To comply with the requirements of the Government for benzol, the necessary additions had been made to the works, and so far the results had been satisfactory. The Company had obtained an Order under the Gas (Standard of Calorific Power) Act, substituting a calorific standard in place of an illuminating power one to enable them to carry on the process. The works and distributing plant had all been maintained in a thoroughly efficient state. In common with other gas companies, they had difficulties due to the men lost for military service. He regretted to say that three of their men had been killed.

It was a trouble they must cheerfully meet, and give their best services to the country's needs. The whole of the staff and all the employees had most loyally served the Company during the half year. When there had been a difficulty, they had been only too willing to overcome it; and, as a result, the half year had passed with everything working smoothly. No one could be very sanguine as to the future while the dreadful war continued, or what there might be to contend with on its conclusion. But there was every reasonable probability that the Company would be able to maintain its present position.

The VICE-CHAIRMAN (Dr. J. W. Lee Glaisher) seconded the motion, which was unanimously adopted.

Proposed by the CHAIRMAN, and seconded by Mr. A. M. PADDON, dividends were declared at the rates per annum of 5¼ p.ct. on the 5 p.ct. ordinary stock, and 5 p.ct. on the 5 p.ct. preference stock, both less income-tax.

The CHAIRMAN proposed a vote of thanks to Mr. Chambers and the staff associated with him for the way in which they had conducted the business of the Company during the past six months. He could only speak most enthusiastically of all the work that had been done at Harrow. Mr. Chambers had been successful in selling close upon 13,000 c.ft. of gas per ton of coal carbonized; his economy of fuel had been very great; and he had had complete control over his men—the result being that all had been truly loyal to him.

Mr. SAMUEL CUTLER, SEN., seconded the proposition, remarking upon the success that had attended the efforts of the Engineer and Manager.

Mr. DARLINGTON remarked that the Directors made a wise choice in selecting Mr. Chambers to succeed the late Mr. J. L. Chapman.

The proposition was cordially passed.

Mr. CHAMBERS thanked the Chairman, Directors, and proprietors very much for their kind vote of thanks to the employees, staff, and himself. Appreciation was like lubrication; it did indeed make the machinery run smoother. As the Chairman had said, these were difficult times; and they had no doubt got more coming in the future. But they looked forward with confidence. If only everyone would pull together, and do his best, the Company would get safely through the troubled days ahead. The most perplexing thing was the increase in the consumption of gas. During the month just past, compared with the corresponding one of last year, the increase was 22 p.ct. This was not an easy matter to deal with. Perhaps it might interest the proprietors to know that the 16 p.ct. increase referred to in the accounts under review represented the total annual make of the Company when he came into their service 27 years ago. The make then was not 30 million c.ft.; but 16 p.ct. increase now represented over 30 million c.ft. It was not until 1903 they reached 100 million c.ft. But since that time they had about quadrupled the amount. This year the output would be 400 million c.ft., which was 300 p.ct. increase in fourteen years. It had required the constant thought of the Directors and the staff to keep pace with this condition of things. There was much to be thankful for in having around one those who gave loyal support. With few exceptions, he had been well supported, and this did make things easy going. They had good stocks of coal, the district was growing well, and if they could only get the war over, he was sure there was a great future for the Company, judging from the amount of business they had now to refuse. They were just on the point of having to send round circulars, saying that, in present circumstances, they could not undertake more work. They were inundated with orders, but could not possibly, with the shortage of men, keep pace with them.

Mr. R. S. BATHE proposed a hearty vote of thanks to the Chairman and Directors. He remarked that the balance-sheet was a most satisfactory one to all concerned.

Mr. W. RICHARDS, in seconding, said the vote was well deserved. The Directors had successfully coped with the difficulties, and had given the proprietors an excellent report and good dividend; and they were indeed all deeply indebted to them for what they had done.

The motion was cordially agreed to.

The CHAIRMAN heartily thanked the proprietors for this expression of their confidence.

STRETFORD GAS COMPANY.

The CHAIRMAN (Mr. W. A. Nicholls), in presenting the report and balance-sheet at the 129th half-yearly meeting of the Company, said the financial position was extremely satisfactory, despite the fact that large sums had been spent on the works and plant so as to keep them in a satisfactory condition. At no time during the half year had they been in difficulties in supplying as much gas as was required by the consumers. In fact, they had always been in excess of the demand, and were in the position of being able to work at least the next six months without any addition to the price; nor had it been necessary to withdraw anything from the reserve fund, as there was a balance in hand over and above what was necessary to pay the dividends. The working expenses showed an increase of £6900. On the other hand, gas-rentals and residuals were £7850 up; and the balance carried forward was £5581, against £5105 in 1916. After paying the dividends, the carry-forward was £1903, as compared with £1232 at the beginning of the half year. With regard to coal purchases, great difficulty had been experienced in obtaining offers, from the fact that no replies at all had been received to two sets of advertisements. But after considerable negotiations and correspondence, they had succeeded in buying all they thought would be required at a slightly better average price and quality. The Coal Controller had now upset these arrangements; and fresh contracts had to be made for a very considerable quantity of coal which had been ordered from the Yorkshire fields. Various Government Departments were constantly altering their requirements. The Company had up to a few months ago continued washing the gas with tar in order to produce the toluol needed. Then the Coal Controller asked them to reduce the use of coal, owing to difficulties in raising, which he said were beyond the control of the producers. This was after the Company had carried out the Government Department's wish, and erected a benzol and oil-washing plant at a cost of over £2000, and gone to the expense of approaching Parliament for power to use previously prohibited land. The proprietors would be glad to know that the Board had won the fight over the Provisional Order; and it had now passed the House of Commons. The next step by the Coal Controller was that the use of coal must be reduced by making as large a percentage as possible of blue water gas; and within a few weeks of getting this going, the plan was off, and gas-works were now to make more coal gas, carbonizing at a very low temperature in order to produce more tar and benzol. This meant a very much larger use of coal, as the make per ton must be reduced; and it involved employing a considerably increased amount of labour, which, of course, was very difficult to obtain. The Directors were still in negotiation with the Government as to the last orders; but the turning-point would be lack of men. Though the Board were always trying to obtain them, and had advertisements appearing in the local papers regularly, they had not so far succeeded in engaging a sufficient number.

The DEPUTY-CHAIRMAN (Mr. E. Hibbert) seconded the motion for the adoption of the report and accounts, and stated that the good feature was an increase in the gas consumption of 8 p.ct. The Company were helping in the production of war material, not only in the production of toluol and benzol, but also in the supply of gas for power purposes. The gas consumption in Trafford Park was over 30 p.ct. in excess of what it was in 1916. The Board of Trade had granted the Company's application under the Calorific Standard Act; and an Order had been issued which bound the Company to supply gas testing at 500 B.Th.U. gross. He thought this would be to the advantage, not only of the consumers, but also of the shareholders.

The adoption of the balance-sheet was supported by several shareholders, and unanimously agreed to.

A resolution was passed authorizing the Board to continue the usual subscriptions to Red Cross Hospitals; and a vote of thanks was accorded to the Directors and staff for the work in the past six months. This was replied to by the Chairman, the Engineer and Manager (Mr. H. Kendrick), and the Secretary (Mr. W. Blundell).

SALFORD GAS UNDERTAKING REPORT.

The report to the Council, for the past financial year, of the Salford Corporation Gas Committee (signed by the Chairman, Alderman F. S. Phillips) states that, notwithstanding the war, the number of consumers has slightly increased during the year. The sales of gas have, however, shown a decrease equal to 7·82 p.ct., due to the restrictions on private and public lighting, and to the earlier closing of licensed premises. The coal and cannel carbonized amounted to 131,455 tons, as compared with 157,579 tons during the previous years, and the quantity of gas made to 1,520,763,000 c.ft., as compared with 1,643,348,000 c.ft. for the previous year. The erection of the installation of vertical retorts at the Regent Road works is progressing more satisfactorily; and it is hoped that the installation will be completed and working early in 1918. The total number of cookers, ordinary and prepayment, on hire at March 31 was 17,620; and the total number of gas-fires on hire was 2747. These figures show a considerable advance on last year. The receipts from the sales of coke and sulphate of ammonia show increases. Coke has realized £6442, and sulphate of ammonia £1137, more than last year. Last year, 1,747,000 c.ft. of gas was supplied free of charge to hospitals and Belgian refugee homes in the borough.

In addition to the loss of revenue due to the large decrease in the consumption of gas, the expenditure has been exceedingly heavy, owing to advances in wages, increased war bonuses, additional payments to dependants of men on active service, a further advance in the cost of coal, and continually rising prices of all other materials required. Since the close of the financial year, the Council have granted a further increase in the war bonus to employees. It is also probable that there will be a further increase in the cost of all materials required during the current year; while there is no prospect of any increase in the value of residual products. Coke will most likely maintain the present satisfactory price; but, owing to the Government control, the prices realized for sulphate of ammonia will not be likely to advance over those of the last financial year. There is no probability of any immediate advance in the value of tar; pitch at present being a drug on the market.

Owing to these circumstances, and to the fact that the Committee have no reserve fund to meet the increased expenditure, they were reluctantly compelled to recommend the Council to increase the price of gas. The Committee's final recommendations were adopted by the Council on June 22.

1.—That from and after the reading of the meters for the quarter ended June 30, the discount of 4d. per 1000 c.ft. of gas hitherto allowed to consumers by ordinary meters within the area of supply be reduced to 2d.

2.—(*a*) That from and after the reading of the meters for the quarter ended June 30, the price of gas to all consumers by ordinary meters within the area of supply be increased by 2d. per 1000 c.ft.; and (*b*) that from and after June 30 the price of gas to all consumers by prepayment meters within the area of supply be increased by reducing the quantity of gas supplied for 1d. from 27·27 to 25 c.ft., the increase in price to commence from the date of the first collection of coins from each meter after June 30.

The make of gas per ton of coal carbonized was 11,569 c.ft., as compared with 10,429 c.ft. in the preceding year.

A small outbreak of fire occcrred at the Admiralty, where a defective electric circuit caused an outbreak in a corridor.

An installation for supplying gas to motor vehicles was started last week, at the Valley Road works of the Bradford Corporation.

NOTTINGHAM'S PROPOSED NEW PRICES.

The absence of both the Chairman and Vice-Chairman of the Gas Committee from Monday week's meeting of the Nottingham City Council, led to the postponement of the report recommending an increase upon pre-war rates equivalent to 6d. per 1000 c.ft., inclusive of an advance of 12½ p.ct. which has been imposed upon the general body of consumers since that period. Although there was no discussion, the recommendation of the Committee has naturally not been allowed to go uncriticized outside the Council Chamber. The difficulties in the present abnormal times are admittedly great; but in view of extra burdens which have been entailed by the district rate, and their inevitable augmentation if concession be made to further labour demands, it is suggested that gas consumers, who have contributed abundantly to the municipal revenue, may reasonably ask for further consideration. In this connection, it is being pointed out that during the last ten years of the working of the undertaking, thanks to admirable administration, the profits have never fallen below £103,713, and have established a record since Mr. John Wilkinson has had the managerial control—the figures rising from £106,595 in 1912 to £129,305 in 1913, £131,917 in 1914, and £130,083 in 1915. There was a fall to £125,887 in 1916, and to £105,357 last year. The gross profits for the decennial period here taken aggregated no less than £1,156,344; while within the same ten years a total of £350,000 has been voted in relief of rates.

It is urged that gas consumers, and especially those paying large accounts, are placed under inequitable burdens, contributing in a double measure to the district rate. But the grievance is obviously inevitable, so long as the gas undertaking is regarded mainly as a means for rate reduction, in which non-consumers share, alike with those who contribute towards the result.

ROCHDALE GAS CHARGES ADVANCED.

Price for Prepayment Meters Not to be Increased.—Gas-Driven Motors.

At the last monthly meeting of the Rochdale Town Council, Sir James E. Jones (in the absence of Mr. G. Walker, the Chairman of the Gas Committee) alluded to the recommendation of the Committee that the price of gas for all purposes should be increased by 4d. per 1000 c.ft. ["JOURNAL," Sept. 4, p. 435], making the present price for lighting 3s. 4d., subject to the usual discounts varying from 2d. to 5d. per 1000 c.ft., according to the quantity used. For purposes other than lighting, the charge would be 2s. 4d. to 3s. per 1000 c.ft., according to consumption. It was not proposed at this juncture to alter the price of gas to prepayment meter users, owing to the expense involved and the difficulty in securing the necessary labour. "Slot" consumers would, therefore, still receive 27 c.ft. for 1d., equal to 3s. net per 1000 c.ft.; but the number of these meters in use would not be further increased. The alteration in price would take place from the next quarterly inspection of meters, which meant that the two winter quarters would be affected by the advance. In round figures, this represented 60 p.ct. of the year's consumption. The proposed increase in price was estimated to yield an extra £5350, which would still be [as stated in the previous number of the "JOURNAL"] a small deficiency, even assuming that the consumption remained the same as last year and working costs were not increased.

After stating that the items for which provision has to be made included a debit balance of £2258 for 1916, extra cost of labour (£2600), and increased cost of carting (£700), Sir James went on to say that it was certain that the increased charges on the debt would be higher; but some reduction might be looked for on income-tax, as the disposable profits were less last year. No attempt had been made to do more than meet the various needs of the situation—an obvious allusion to the allegation of "profiteering" which was made against the Committee when an advance of 6d. was mooted to cover the present deficiency.

Replying to criticisms on the policy of the department, chiefly as to whether the Gas Committee could not remove the "anomaly" by which a consumer of less than 10,000 c.ft. had to pay on a higher scale than one taking over 10,000 ft., Sir James Jones said the matter had been gone into, but the Committee could not for the present make any alteration.

Alderman Diggle regretted that the Gas Committee could not find "a remedy for the anomaly whereby a person who consumed 9500 c.ft. was charged more than the consumer of over 10,000 c.ft." It was a provoking system which led to a great waste of gas, because in order to obtain the financial benefit of the arrangement some people let the gas "blow off" until they reached the 10,000 c.ft. rate.

Mr. Shawcross remarked that the Gas Committee should take a leaf out of the book of the Income-Tax Commissioners, who found means of surmounting a similar difficulty in regard to income-tax.

The Committee's recommendations were agreed to.

In reply to a member, Sir James Jones said the cost of converting a motor-van to gas-power was about £15. He had been told by a trader who had adopted this course that the adaptation paid for itself in about three months.

Mr. Bryning congratulated the Gas Committee's forward policy in regard to the use of coal gas for motor vehicles, and said he was informed that the cost of running by gas was only about a fourth of the expense of petrol. The Manchester Gas Department had given facilities to garages where motorists could re-fill with gas, and so not lose time. Having regard to the present shortage of petrol, he suggested that the Rochdale Gas Committee might very well provide accommodation at the gas-works where motorists could renew their power.

The matter was left in the hands of the Gas Committee.

Price of Gas at Portadown.—The Portadown Gas Company have increased the price of gas from 4s. 7d. to 5s. per 1000 c.ft.

DUBLIN DISTRICT GAS LIGHTING.

Allegations by Rathdown Councillors.

Arising out of a proposal of the Alliance and Dublin Consumers' Gas Company to take over the lighting of Stillorgan and Dundrum from the Rathdown (co. Dublin) No. 1 Rural Council, on terms which would lead to a saving of about £60 a year, Mr. James Collins, at a meeting of the Council, said that Mr. Grey and other Englishmen had control of the Company, and had dismissed some of the older officers, in view of which he asked what guarantee the Council would have that similar action would not be taken in regard to the Council's employees. In one instance, an officer of 25 years' standing had been dismissed without pension, though the Company had a pension fund of £25,000. It was, said Mr. Collins, desperate treatment to give a man because, as he said, of his political opinions. It was stated, he alleged, that the officer in question was brought before the Secretary and cross-examined about his political views, and that a short time afterwards the man was dismissed.

Mr. John Cullen said the officer had eight children dependent upon him; and he would not, in the circumstances, be in favour of handing over the lighting to the Gas Company, as he would not believe in any guarantee that might be given by them.

Mr. Barrington Jellett, J.P. (Acting Chairman), said he had heard that the Company ruthlessly dismissed hands employed by them.

Mr. Cullen observed that, not only had they done this, but from any really good position the old officer had been cleared out, and an Englishman brought over and placed in it. Was this fair? Were they, as Irishmen, so incompetent that they were not able to carry on a business like that? It was, he held, a disgraceful action on the part of the Gas Company to oust Irishmen, seeing that Dublin used the gas and Dublin money paid for it.

Ultimately, the Council appointed a deputation to wait on the Gas Company in reference to the lighting question.

THE SHEFFIELD EXPLOSION.

A Fatal Result.

Last Thursday formal evidence of identification and medical evidence were taken at an inquest held at the Sheffield Coroner's Court on Ernest Mottershead, one of the men injured in the explosion at the Grimesthorpe Gas-Works, reported last week, who succumbed to his injuries in the Royal Infirmary on the 5th inst.

Mrs. Louisa Mottershead, of Broughton, near Manchester, said the deceased was her son, 28 years of age, and formerly employed at an engineering works at Manchester. He joined the Army in the Royal Welsh Fusiliers, and later, on account of his eyesight, was transferred to a labour battalion of the South Lancashire Regiment. Subsequently he was sent to the Grimesthorpe Gas-Works, Sheffield. On the night of Aug. 27 she was sent for from Manchester, being informed that her son had been badly burned. She came to Sheffield the following day, and was with him until he died. He told her that, while loading coke, he was blown down by the explosion, that he got up again and ran, and was again blown down. He then crawled as far as he could on his hands and knees, having to pass in this way through the fire that was raging. He did not blame anybody for the accident.

Captain Wigram, the Resident Medical Officer at the Sheffield Royal Infirmary, described the condition of Mottershead when admitted to the Infirmary on the evening of the accident. He was extensively burned on the head, face, back, chest, arms, and legs. His condition was hopeless from the first. He died from burns and septic absorption—a condition arising from his injuries.

The Coroner (Mr. J. Kenyon Parker) intimated that some of the other injured men were in a critical state, and it was necessary to adjourn the inquiry for a week.

GAS-DRIVEN MOTOR VEHICLES.

Manchester Gas Committee's Enterprise.

Alderman William Kay, J.P. (the Chairman), presided at a fortnightly meeting of the Manchester Gas Committee, at which the Superintendent (Mr. Fredk. A. Price) submitted a report dealing with the question of gas-driven motor vehicles. The Committee decided to encourage the new enterprise by every means in their power.

After referring to the shortage and high price of petrol, Mr. Price stated that coal gas is now being used extensively in many towns for driving motor vehicles—notably in Blackpool. Several inquiries having been received from Manchester motor-vehicle owners, he communicated on the subject with Mr. William Chew (the Engineer and Manager of the Blackpool Corporation Gas-Works), and also requested Mr. William Barrett (the Acting Manager of the Manchester Corporation Private Lighting Department) to make inquiries in Manchester on the subject. Mr. Chew replied as follows:

We are at present filling a large number of gas-bags for motor vehicles. We have arranged a number of filling-points all about the works entrance. The motors draw up in the street and connect their bags to our pipes, against the buildings. Our filling-pipes are all gasholder pressure, to facilitate quick filling. We have one filling-point supplied through a 200-light meter, for testing the capacity of a bag the first time it is filled. Afterwards, they are all filled without registering. Exclusive of the meter, the cost of installing the pipes was only a few pounds.

Mr. Barrett's report was in these terms:

From inquiries I have made, I find that a small private company is being formed in Manchester for the purpose of supplying flexible gas-bags and cylinders, and fitting same to commercial motors, &c.; and they have orders

in hand for over thirty bags to be fitted to cars in the Manchester district. In an interview I had a few days ago with a representative of this Company, the question of re-charging was discussed; and he pointed out that, if the venture was to be a commercial success, it would be necessary to provide means in all districts for rapidly re-charging the bags. The bags are made in various sizes, according to the size and make of the vehicle—ranging from 300 to 1500 c.ft. capacity; and it is essential that the largest bag should be re-charged in not more than one hour. This means that a 250-light meter is required for the work; and as it is advisable to have a reserve, I suggest that a 300-light meter would be better.

In order that there should be a re-charging station in every district covered by the Manchester area of supply, it will be necessary to instal meters in each of the following districts: Town (1), Moss Side and Rusholme (2), Hulme, Old Trafford, Chorlton-cum-Hardy, Withington, Didsbury, Ardwick, Gorton and West Gorton, Openshaw, Beswick, Bradford, Clayton, Crumpsall and Cheetham, Harpurhey and Blackley, Levenshulme and Burnage, Newton Heath, Whalley Range and Stretford, Chorlton-on-Medlock, and Droylsden.

I suggest that these meters should be fixed under our supervision on the premises of garage proprietors, after the necessary permission has been obtained and suitable arrangements made. The garage proprietor should be authorized to supply gas as required, and charge for same at a price per 100 c.ft. to be fixed by the Gas Committee, and be responsible to the Gas Committee for the gas consumed as registered by the meter. The object of the Gas Committee in fixing the price per 100 c.ft. at which the gas is to be sold, is to ensure a uniform price throughout the district; to ensure the garage proprietor receiving a profit for his trouble and time in making connection to the bags and re-charging; and to prevent the garage proprietor charging an excessive price, and thus interfere with the use of gas for the purpose. Assuming that the gas will be charged to the garage proprietor at gas-engine rate—2s. 9d. within the city—I suggest that the garage proprietor should be authorized to charge 4d. per 100 c.ft. for re-charging.

I think this matter is worth consideration, seeing that the use of gas for motor purposes will be considerable in course of time. A great deal of interest is being taken in the question.

Mr. Price made the following recommendations, which the Committee unanimously adopted:

1.—That gas supplied from the Corporation premises for the purpose of driving motors be fixed at 4d. per 100 c.ft. net, and be paid for in cash at the time of the delivery.
2.—That the Gas Engineer be instructed to install suitable charging apparatus at each of the gas-works without delay.
3.—That, having regard to the prospective rapid development of the business, the Chairman (Alderman W. Kay) and Deputy-Chairman (Alderman R. Birtles) be authorized to make such other arrangements as they may from time to time consider desirable, and report.

No better place could have been chosen for one of the two Manchester town filling-stations than the old Whitworth Street West meter-stores, which are now utilized as the demonstration depôt, for showing to engineering and other firms the value and utility of gas in the heat treatment of metals for the manufacture of munitions of war, and for other industrial processes. Under the direction of the Chairman of the Gas Committee, facilities have already been afforded for filling bags at the Whitworth Street depôt. In the opinion of Mr. Price, it will be desirable, in addition to providing facilities at the Corporation depôts and works, to arrange with proprietors of garages to instal the necessary apparatus. It is claimed that 250 c.ft. of gas, costing 10d., is equal in propelling power to a gallon of petrol.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 10.

Inquiry for pitch is brisk, and the market continues firm. Makers' price is not below 45s. net in bulk at works. A fair number of shipments are being made. Solvent naphtha is scarce, and the price is firmer at 2s. 3d. to 2s. 4d. per gallon net and naked *ex* works. The Ministry of Munitions has now issued orders by which crude benzol and dehydrated tar will be brought under Government control as from the 1st prox.

Business in sulphate of ammonia for agriculture is brisk—both dealers and farmers wishing to take delivery of quantities this month in order to take advantage of the low price prevailing.

Tar Products in the Provinces.

Sept. 10.

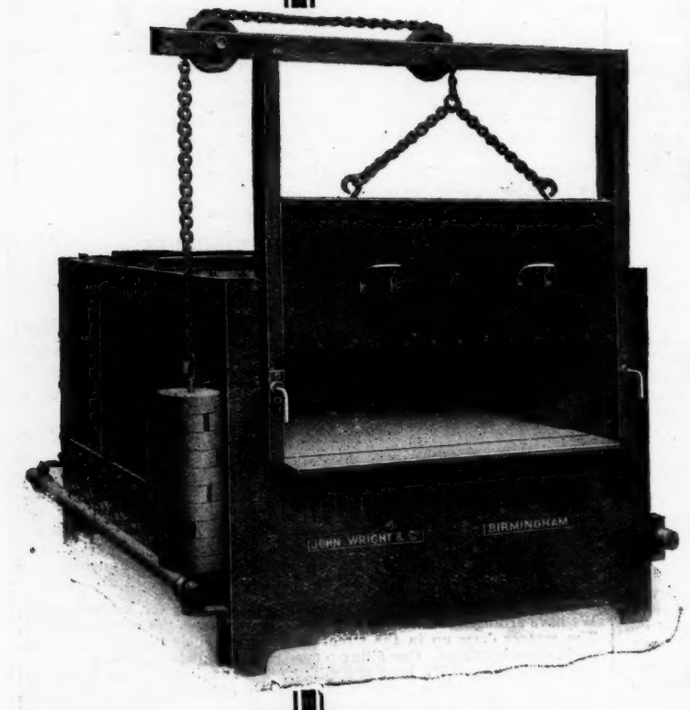
There is nothing fresh to report concerning the markets for tar products.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3¼d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1¼d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

The number of products in which what may be considered a free market still exists is gradually becoming smaller; the latest to come



: WRIGHT'S :
GAS-HEATED OVEN
FURNACES
for Annealing, Hardening, and other Heat-Treatment of METALS. . . . .

VERY STRONGLY CONSTRUCTED.
LARGE RANGE of STANDARD SIZES.
UNIFORM TEMPERATURES SECURED
ECONOMICAL GAS CONSUMPTION.

JOHN WRIGHT & Co.
ESSEX WORKS . . BIRMINGHAM.

under official regulations being coal tar, in which, after Oct. 1, dealings will only be permissible under licence. The order, of course, does not affect the distiller. Reference was made in last week's report to the order relating to crude benzol, naphtha, and light oils; but unfortunately comment thereon was somewhat ambiguous, and has given rise to the idea that naphthalenes also have been placed under official control. This is not the case at present, although rumour credits authority with the intention of assuming control almost at once. The existing regulations in this case affect only the export trade, where the system of licences has proved a great hindrance to business, as has before been pointed out in these notes; and in commenting on the naphtha and light oils order last week, the intended comparison was with the system of licences involved in each case rather than the orders themselves. Naphthalenes remain firm, with prices unchanged. Solvent naphtha is stronger again in the Provinces, and the heavy is also creeping up. Aniline oil is a shade harder, and an improvement is to be noted in cresylic acid; the lower prices of the past two weeks having proved attractive—indeed, the supply in some centres appears to be now rather on the short side. Benzol and toluol remain steady, and creosote is a purely nominal market in which the making of quotations is difficult, inasmuch as no idea is available of the Government's intentions regarding the price at which supplies will be taken over. Permits for sale, however, have been more readily obtainable of late. Considerable interest is still shown in the position of pitch, for which a good demand keeps up at or about 48s. per ton f.o.b. London. Provincial holders are awkwardly situated at present—a position of which some buyers have endeavoured to take advantage. Offers of 12s. to 14s. per ton have been made; but holders prefer the pitch to the money—the strength of the export situation encourages them to refuse such offers, which they characterize as ridiculous. They are accordingly adopting a Micawber-like attitude, and are waiting for "something"—in the shape of shipping facilities—"to turn up." Certainly they can do nothing at present, and, all things considered, their policy will probably pay, as in London buyers are already having trouble in the placing of their orders. The range of quotations is as follows:

Aniline Oil (pure): 1s. 3d. per gallon.

Benzol: 90 % London, 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 28s., Midlands 23s. 6d.; North 24s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. 6d. to 19s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190 % 1s. 8d. to 1s. 9d.; North 1s. 2d. to 1s. 3d. per gallon; 90-160 % naked London 2s. 3d. to 2s. 4d.; North 1s. 11d. to 2s. 1d. per gallon.

Crude Naphtha: Naked 30 % 8¼d. to 8½d.; North 6¼d. to 6½d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4¼d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 4¼d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 2s. 5d.; 97-99 %, 2s. 6d. to 2s. 7d.; Glasgow 2s. 2d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Permits for the export of further small parcels, mostly for British possessions, have been granted, and the quotation again shows a hardening tendency. The home demand continues in accordance with anticipations, and farmers evidently find the current official prices attractive—next month the quotation becomes automatically 10s. dearer—although manufacturers view the matter in an entirely different light, and consider they have been badly let down as the reward for their, in many cases, heavy capital outlay necessary to meet Government requirements. This, and the greatly increased cost of production under the headings of labour and raw material, appear to have received no consideration at the hands of the authorities, and manufacturers are practically compelled to sell at very little more than pre-war prices. Efforts are being continued to obtain recognition of their difficulties and, what is more to the point, fairer treatment from the Government; but so far the Committee appointed to deal with the matter have given no indication of the progress, if any, that has been made. In South Wales production is specially good, while orders are considered entirely satisfactory. Speaking generally, the home sulphate position is quite good. Farmers are rapidly learning its value as a fertilizer, and business during the autumn and winter may be expected to exceed substantially that of any previous year.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 17s. 6d.; January-May, 1918, £16 7s. 6d.—all delivered, less 10s. per ton at makers' works.

Export (under licence only): London, Leith, Liverpool, and Hull, £23 10s. to £24 10s. f.o.b.

COAL TRADE REPORT.

Northern Coal Trade.

There is a better demand in the coal trade; but the scarcity of steamers still impedes the movement of the export branch. This is most felt by the steam coal collieries, which depend so largely on the oversea trades. Best Northumbrian steams are busy comparatively, and are about 30s. per ton f.o.b.; second-class steams are plentiful, and are quiet at about 25s. to 27s., according to class; and steam smalls are abundant, and are quoted from 18s. 6d. to 20s. In the gas coal trade, the demand is better, both on the local and the more distant

The
DAVIS
Gas Stove Co., Ltd.

On War Service

—but still exerting strenuous efforts to meet the demand for Davis Gas Appliances

The Gas Exhibition Salons,
60, Oxford St., London, W. 1.

contracts. There is a fair output, which is well taken up generally. Best Durham gas coals are quoted at 25s. per ton f.o.b.; for second-class descriptions the current price is about 23s. 6d.; and for "Wear specials" about 29s. to 30s. For the better class of coals, the demand is full; but second-class gas coal is relatively more plentiful. Freight is higher—19s., Tyne to London, having been paid as freight for gas coal—an advance showing the enlarged demand for tonnage beyond that under contract. To neutral ports, the rate for sea-carriage is at a record height. There is an increased output of coke; but it is well taken up in general. Good gas coke is fairly steady at from 29s. to 31s. per ton f.o.b. Coke freight is still based on about 45s., Tyne to Dunkirk.

A Gas Manager's Bonus.—At Newport (Fife) there is an advance in the price of gas of 2d. per 1000 c.ft., making the rate 4s. 5d. The Gas Manager is to receive a war bonus of 10 p.ct. on his salary.

Electricity Causes Dissatisfaction.—Reports to hand by the last mail are to the effect that the Council of St. Kilda (Victoria) have resolved to revert to the use of gas for the lighting of South St. Kilda; the electric service having caused dissatisfaction.

Stockport Gas Stokers' Pay.—In pursuance of their threat to cease Sunday labour unless their demands for increased wages were conceded, the stokers at Stockport have refused Sunday duty. The matter has, of course, been reported to the Chief Industrial Commissioner's Department.

Success of Vertical Retorts at Truro.—The report of the Directors submitted at the annual meeting of the Truro Gas Company stated that the profit of the year amounted to £1523, and with the amount brought forward from the previous year the credit balance was £1835. Dividends of 5 p.ct. on the preference shares and 4 p.ct. on the ordinary shares were recommended. Mr. J. Thomas suggested that the dividend on the ordinary shares might be increased if a less sum than the Directors proposed were written off on the suspense account. The Chairman (Mr. John James) replied that they would be running a risk if they increased the dividend further, for they could not say what was coming in the future. With regard to the past year's working, they had to congratulate themselves on the success achieved by the installation of vertical retorts. Mr. S. J. Ingram (the Engineer and Manager) said the effect of the diminution of public lighting, the restriction of private lighting, and the operation of the Summer Time Act had been a decrease in the output of gas of 2,250,000 c.ft. As compared with pre-war prices, the cost of coal had increased 75 p.ct.; and the larger profit made in the past year was due to the exercise of economy and the working of the vertical retorts, which had exceeded their expectations in every respect. If they had carbonized all their coal in horizontal retorts, they would have used 1000 tons more than they did. They had made contracts for coal on satisfactory terms. It was agreed to pay the dividends recommended.

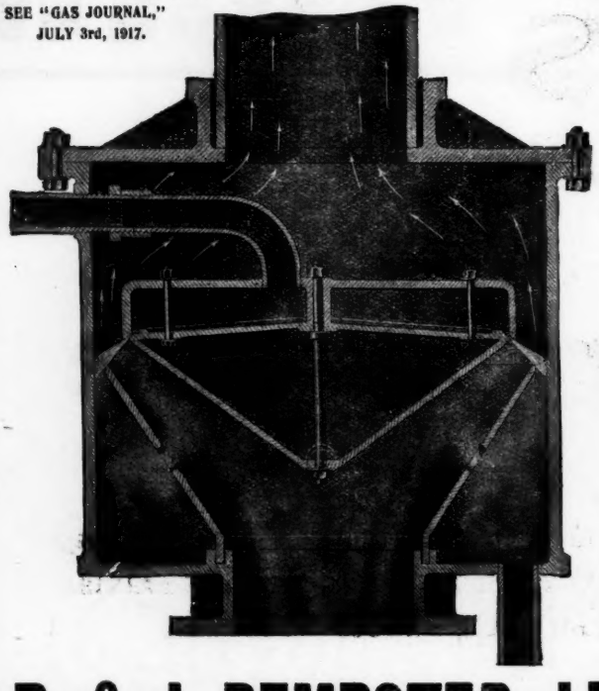
Great Wigston Gas Company.—The half-yearly meeting was held at the Company's works on the 23rd ult., when the usual dividends of 10 and 7 p.ct. were declared. The Manager and Secretary (Mr. John A. Harris) was thanked by the Directors for the excellent results obtained, and unanimously granted an increase in salary of £25.

Alliance and Dublin Consumers' Gas Company.—The Dublin Corporation Paving Committee have approved of plans for a compressor-house at Great Brunswick Street for the Alliance and Dublin Consumers' Gas Company. The Committee reported to the Council that permission was given the Company to open ground at the Grand Canal Quay, opposite their works, to replace a main through which they drew a water supply from Ringsend Dock; but that, on its being reported that the Company had carried out work different from that for which permission had been granted, the permission was withdrawn, and the new pipe was ordered to be taken up.

Waterford Gas Company.—Mr. J. H. Sugrue, presiding at the annual meeting of the Company, said that before the war they had a healthy increase each year; but since the conflict started, the business had shrunk to less than it was in 1909. The high price of coal had necessitated a higher price of gas; and this was always attended by a falling-off of business. Gas companies in Ireland, and particularly in the South, were very hard hit in consequence of the enormous freights which had to be paid. In England the limitation of the price of coal had been of benefit to the gas undertakings; but the Irish companies had to pay more for coal than their friends in similar circumstances across the Channel. In Waterford, they had about 2000 gas-cookers in operation, and 250 fires. They looked for a considerable increase in the number of gas-fires in the coming winter, owing to the price of coal. Resolutions were passed approving of the report and accounts, and declaring the statutory dividend.

Lichfield Council and the Gas Company's Charges.—The Lichfield City Council have again considered at a special meeting the question of the Gas Company's charges. At the previous meeting the Council decided that they would not pay the charges, amounting to £218 per annum, less discount, according to an arrangement between the Streets and Highways Committee and the Company, until some explanation had been given them. Now, after having a letter from the Gas Company on the subject, the Committee adhered to their recommendation that the Council should pay. The Town Clerk said the letter gave details as to how the £218 was arrived at—one year's interest on the capital value of the lighting plant, £77; and maintenance, depreciation, rates and taxes, and painting for twelve months, £141. After some discussion, the recommendation to pay the money was again referred back to the Committee, in order that information may be obtained regarding the Council's legal position, and the probability of them being surcharged by the Local Government Board if they pay. It was stated that the Committee were fully satisfied that the charge was a fair and reasonable one.

"TAR FOG" & TAR EXTRACTOR
(FISHER-FIDDES PATENT)
SEE "GAS JOURNAL," JULY 3rd, 1917.



FOR THE
ELIMINATION OF
TAR & TAR FOG
FROM COAL GAS AND
OIL VAPOURS
FROM C.W. GAS
WHY NOT TRY THE
NEW METHOD
AUTOMATIC
EFFECTIVE &
INEXPENSIVE
PARTICULARS AND PRICES FROM
R. & J. DEMPSTER, LTD., MANCHESTER.
LONDON OFFICE: 165, GRESHAM HOUSE, OLD BROAD STREET, E.C. 2.

Lurgan Gas-Works under the Council.

At a meeting of the Lurgan Urban District Council, the Auditor's report on the working of the gas undertaking for the fifteen months ended in March last—being the first period of the Council's controllership—was submitted. It gave the gross profits at £3540, against which was charged interest upon loans and bank interest, amounting to £2688, together with sinking fund contributions for the redemption of debt to the extent of £1233, leaving a net profit of £8. The Chairman (Mr. H. G. MacGeagh, J.P.) said the accounts were in a satisfactory condition, but it was obvious that, at the present price of gas, they could not find themselves in so satisfactory a position at the end of the current year. For a considerable portion of the past fifteen months, they had been paying for coal 26s. a ton; but it had now risen to 37s. For the first three months of the period, they had sold gas at 4s. 3d. per 1000 c.ft., and for the remaining twelve months at 4s. 6d.—the maximum price allowed under their Special Act. He advised that they should take immediate steps to procure a Provisional Order giving them power to increase the price. The Clerk said they had also the increase of wages to consider. The Auditor's report and the question of obtaining a Provisional Order were referred to the Gas Committee.

Coal Carbonizing Parent Syndicate.—A Company has been registered under this title, with a nominal capital of £2000 in £1 shares, to carry on business as "merchants, manufacturers, and brokers, exporters and importers, engineers, property owners, builders, contractors in all kinds of chemicals, merchandise, and produce."

Meter Charges at Heckmondwike.—The Heckmondwike and Liversedge Tradesmen's Association have protested against the Gas Company giving notice of their intention to make a general advance in meter-rents. They contend that the proposal is illegal. At a meeting of the Association, a letter was read from Mr. F. D. Richmond (the Secretary of the Company) pointing out that the cost of meters and fittings has advanced 77 p.ct., and that the increased rents would give a return of only 7·3 p.ct. on the outlay, whereas the usual basis has been 10 p.ct. Mr. Richmond further said little gas—and in some cases none at all—was used by a large percentage of consumers in summer; and, at the same time, these consumers require as much looking after as the big ones. The Company give free attention to complaints, even when not due to defects for which the Company could be held responsible; and he added that the price of gas in the Company's area has been increased less than the general average. The Secretary of the Association (Mr. Cliffe) described the reply as evasive. The meeting was pretty well unanimous in expressing the feeling that the Company, by increasing their revenue through extra meter charges, did not endanger the statutory dividend, as they might do by advancing the price of gas.

Natural Gas in Italy.—An announcement appears in "The Times" of a discovery of a large supply of natural gas in Italy, which is particularly welcome with the present shortage of coal. The spot where it has been found is about 2 miles from Pisa; and the town is now lit by means of this gas.

Inferior Coal at Barrow—At the Barrow Town Council meeting last week, Alderman Neal, J.P. (the Chairman of the Gas Committee), said he was not surprised to hear complaints about the gas supply. As a matter of fact, they had been getting coal which was only yielding two-thirds of the gas expected; and they had had to resort again to carburetted water gas. Coal which used to come to Barrow from Yorkshire was now going to Birmingham; and the new arrangements for coal control was another blunder on the part of the Government.

Winchester Water and Gas Company.—In consequence of the further large increases in the cost of coal and labour, the Directors felt it necessary to raise the price of gas as from Midsummer last by 3d. per 1000 c.ft. In announcing this fact in the report which was adopted at the recent half-yearly meeting, the Board added that, owing to the difficulties of obtaining material and labour, it has not been possible to execute the usual and proper repairs to the works; but provision has been made for this. The balance of net revenue account available was £9122; and a dividend, less income-tax, at the rate of 4¼ p.ct. per annum was declared for the half year on the consolidated ordinary stock. The Chairman (Mr. J. C. Warner) said that he had to offer on behalf of the Directors, and he was sure on behalf of the shareholders also, an expression of their warmest thanks to Mr. H. C. Head (the Engineer, General Manager, and Secretary) for the great services he had rendered the Company during the past six months. It had been a most arduous time.

Conservation of Food Stuffs in the United States.—Following the energetic lead of the National Commercial Gas Association, the principal gas undertakings are moving in this matter. The Consolidated Gas Company of New York have opened a Government exhibit, occupying the entire second floor of their spacious new offices, under the general charge of Prof. F. Lamson Scribner (Chief of the Agricultural Department's Bureau of Exhibits) and of Mr. O. H. Benson (Chief Department Expert on Food Dehydrating, Canning, and Preserving). On several days previous to the opening, Mr. Benson was lecturing and demonstrating before large classes of women recruited by the Gas Company, intended to qualify as demonstrators and to teach others, by holding free classes daily in all the district offices belonging to the Company. Exhibits from the Department of Agriculture, together with many of the most instructive displays from the San Francisco Exposition, have been arranged; and the opening day was a great success. Demonstrations will be given daily. The exhibition will be open for four or five weeks; and Prof. Scribner regards it as the biggest thing that the department has yet undertaken.

BRASS WORK

WE HAVE A GOOD STOCK OF TAPS, &c.

Send us your enquiries.

SAWER AND PURVES

(Branch of Meters, Ltd.)

MANCHESTER. NOTTINGHAM.

Worthing Gas-Works Results.

The half-yearly meeting of the Worthing Gas Light and Coke Company was presided over by the Chairman (Mr. H. H. Gardner), who said the output had increased and was increasing; and, on the whole, he thought the proprietors would be satisfied with the results. The sale of gas in the six months ended June 30 had realized £1434 more, which was partly accounted for by the increase of 2d. per 1000 c.ft. in the price in the second quarter, but was mainly caused by an increase of 6,208,500 c.ft. in the quantity sold. Coal had cost 1s. per ton more; and war bonuses to employees figured at £337. The balance carried to profit and loss account was £3852, as compared with £3581 a year ago. The report having been adopted, a dividend at the statutory rate of 5 p.ct. per annum was declared. The working statement of Mr. Sidney O. Stephenson (Engineer and General Manager) showed that the make of gas per ton of coal carbonized worked out at 11,441 c.ft., of which 10,615 c.ft. had been accounted for. These figures would have been even better had the whole of the coal been of the proper quality. The net cost per 1000 c.ft. of gas into the holder was 1s. 8d., as compared with 1s. 8½d. in 1916. During the past half year, a plant has been erected for the extraction of benzol from the gas, to further assist the Government.

Lisburn Gas Price.—The Lisburn Urban Council have decided to raise the price of gas, as from Oct. 1, from 4s. to 5s. per 1000 c.ft.

City of Chichester Gas Company.—Conditions at Chichester would appear to be on the mend; for the Directors were able to report at the half-yearly meeting an increase of slightly over 10 p.ct. in the sales of gas. This is the first increase experienced by the Company since the outbreak of war. The higher prices that have had to be paid for coal and other materials have again materially affected the accounts; but the larger returns from gas and residuals counterbalanced the extra charges. The balance standing to the credit of the profit and loss account was £1678; and dividends were declared for the half year at the rate of 5 p.ct. per annum upon the "A" capital stock, and 3½ p.ct. per annum upon the "B" and "C" capital stocks, both less income-tax.

Smart Progress at Detroit.—The Detroit City Gas Company do not allow war contingencies to interfere with rapid extensions, or take a gloomy view as to the future supply of petroleum. They have recently completed a 7 million c.ft. set of carburetted water-gas plant, and placed the order for another—and this at a time when others are complaining about the continually advancing price of petroleum, and reverting to the use of coal. They have acquired 10 acres of land, and now have ten stations, all interlocked to admit of changing the sources of supply as circumstances may require. The storage plant includes a 3 million c.ft. gasholder; and this large unit is in course of duplication. A large pumping-station is in progress; some 75 miles of mains will be laid in the course of the current year; and a similar length is in contemplation for 1918. The service-piping put down during 1917 will aggregate over 1,000,000 ft. in length.

Capital and Revenue Expenditure at Wigan.—A point was raised in the Wigan County Borough Council with regard to the provision of plant out of revenue. Mr. Alstead said he wondered how much plant had been bought by the Gas Committee out of revenue during recent years. He had been much impressed by the laxity in vogue in all departments of the Corporation, in regard to keeping records of such amounts; and it would be interesting if the Chairman of the Gas Committee would try and find out how much money had been spent on plant out of revenue, and where the plant was. In reply, Mr. Farr said the general policy of the Gas Committee had been to spend out of revenue in special circumstances; and this, he thought, was the correct policy. They had an undertaking which, in their opinion, was very much over-capitalized; and they were trying to keep capital outlay within bounds as far as possible. This seemed to him to be the more sensible procedure.

Record Consumption at Tonbridge.—The past half year has been a memorable one for the Tonbridge Gas Company, on account of the big increase in the consumption of gas. This increase amounted to 9¼ million c.ft., or nearly 15 p.ct.; and during certain periods the gain was 33 p.ct. as compared with the corresponding period of last year. This, said the Chairman (Mr. W. Judd), at the meeting, had caused much anxiety to the Manager (Mr. J. Donaldson) and the staff. A pleasing feature, he added, was that the day output was double that of the night. The report showed that the increase in revenue was £1358, which followed upon an increase of £2431 last year; and the Directors see no reason at present for raising the price of gas. The Chairman said that their Provisional Order, for raising new capital, &c., which has just been passed, gives the Company practically all they asked for. They had to congratulate themselves on having only increased the price of gas 4d. per 1000 c.ft. during the three years of the war. They had been able to earn their dividends, notwithstanding the many difficulties which had had to be encountered.

Colchester Gas Company's Change.—Last year the Colchester Gas Company were changed from a maximum dividend into a sliding-scale undertaking; and the dividends have now been increased from 10 and 7 p.ct. to £10 15s. and £7 10s. 6d. p.ct.—the price of gas being still 3s. per 1000 c.ft., the same as before the war. Of course, in this case the standard price was fixed in 1916 with due regard to the position brought about by the war, and the prospects before the industry. The accounts presented at the recent half-yearly meeting showed a balance of profit of £2917; and the Vice-Chairman (Mr. W. G. Benham), who presided, said the period had been a remarkable one in the history of the Company. There had been an increase of no less than 15 p.ct. in the output of gas. The consumers now total 7917, or nearly equal to the number of inhabited houses in Colchester. He desired, on behalf of the Board, to acknowledge their indebtedness, and also that of the shareholders and the consumers, to the Engineer and Manager (Mr. W. W. Townsend), the Secretary (Mr. W. English), and the staff generally. Mr. Townsend had met all difficulties with admirable judgment, skill, and courage.

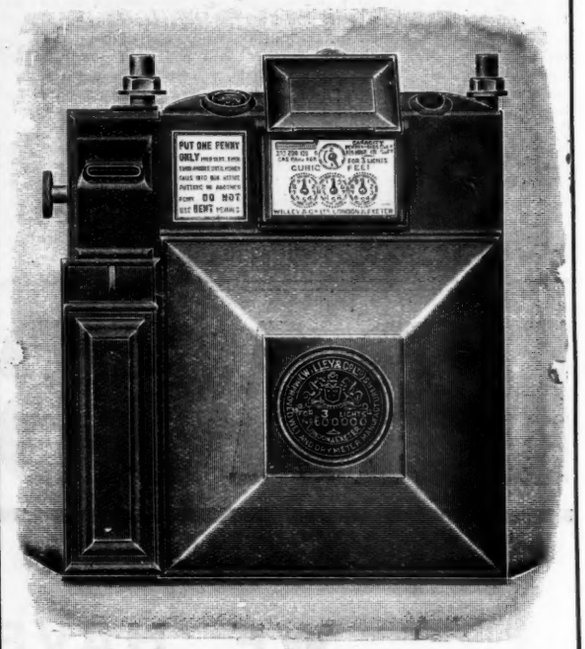
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD.,

Exeter, London, Manchester, Leicester.

Telegrams: "WILLEY, EXETER."—"GASVILLADO, KINLAND, LONDON." "METERS, LEICESTER." "WILMETER, MANCHESTER."

Telephone Nos.: 133 EXETER. 294 DALSTON, LONDON. 4777 LEICESTER. 7419 CITY (MANCHESTER).

LONDON WORKS & OFFICES:
89-95, Hertford Road, Kingsland, N.
LEICESTER:
5, Oxendon Street.
MANCHESTER:
John Street, Booth Street West, S.W.

AGENTS FOR SCOTLAND:
D. M. NELSON & CO., 20, WEST CAMPBELL ST., GLASGOW.

No Manager to be Obtained.—At a meeting of the Gas Committee of the Kirkcudbright Town Council, it was agreed to allow Mr. H. F. M'Nair, the Gas Manager, to visit Dalbeattie once a week and superintend the works there. It was stated that the Dalbeattie Gas Manager had been called up for service; that the manager appointed in his place had given notice; and that no other manager could be obtained for Dalbeattie.

Cork Gas Consumers' Company.—Considering high freights and other adverse conditions, Mr. W. B. Harrington (the Chairman) said at the half-yearly meeting of the Company that he thought it satisfactory to be able to recommend a dividend at the rate of 6 p.ct. per annum for the half year. They had not put anything aside for depreciation, and had to take a little from the reserve fund to pay the interest named. The balance of profit and loss was £3262; and the dividend required £3290.

Price of Gas at Ulverston.—The Ulverston Urban District Council have empowered the Gas Committee, after the price of coal has been definitely settled, to increase the cost of gas to such a figure as will make the gas-works remunerative. If the Coal Control Board's new scheme is carried out, Ulverston will not be able to continue its coal supply from Yorkshire, but will have to take it from Northumberland and Durham, which will mean an increased cost of 5s. to 6s. per ton at present rates and freightage.

Wages at Leeds.—The Chief Industrial Commissioners' Department having awarded a further 2s. a week as war bonus to the members of the General Workers' Union in the Leeds Corporation Gas and Electricity Departments, the City Council have approved a recommendation of the General Purposes Committee that the increased bonus be granted to all Corporation officials and workpeople whose wages or salaries do not exceed £250 per annum. The 2s. is in addition to 7s. already being paid. The new bonus is to be retrospective to Aug. 1.

A Record at Morpeth.—Addressing the shareholders at the annual meeting of the Morpeth Gas Light Company (1902), Ltd., the Chairman, Mr. R. Crawford, said that last year was a record for them; the profit amounting to £2186. The quantity of gas sold was 24,206,000 c.ft., as compared with 26,377,000 c.ft. in the preceding twelve months. It had been an anxious period; but the Directors and officials had been amply repaid by the success which had attended their efforts. He referred in eulogistic terms to the work of the officers and men. Mr. Richard Lockey (the Secretary and Manager), he said, had rendered excellent service to the Company during the year. A dividend on the ordinary shares of 5 p.ct. per annum, free of tax, was declared.

A Larger Consumption at Southgate.—As compared with the results for the corresponding half of 1916, the sale of gas by the Southgate and District Gas Company in the six months ended June 30 last showed an increase of 10,785,500 c.ft., or 9·9 p.ct., and the revenue from residual products an increase of £969. The expenditure on revenue account, however, exceeded that of a year ago by £2644; coal and oil representing £2075 of this amount. After providing for interest charges, &c., there remained a balance of profit of £5237; and out of this were declared, at the meeting last Thursday, dividends for the half year at the rates per annum of 5 p.ct. on the preference capital, 10 p.ct. on the original capital, and 7 p.ct. on the additional capital—leaving £912 to be carried forward.

Oxford Gas Light and Coke Company.—It was stated in the report adopted at the annual general meeting of the Company that the business for the year ended June 30 had been satisfactory, especially considering the lighting restrictions, and the difficulties of transport and shortage of labour. The Directors had, however, to record a slight reduction in the quantity of gas sold, together with an increased cost of coal carbonized, as compared with the previous year; but, assisted by better returns from residuals, any further increase in the price of gas has so far been avoided. The statutory dividends were declared. The receipts on revenue account amounted to £83,238, against £75,217; the expenditure being £72,575, as compared with £64,929. No expenditure on capital account was incurred during the year; the total outlay remaining at £234,618.

A small fire occurred at the Admiralty, where a defective electric circuit caused an outbreak in a corridor.

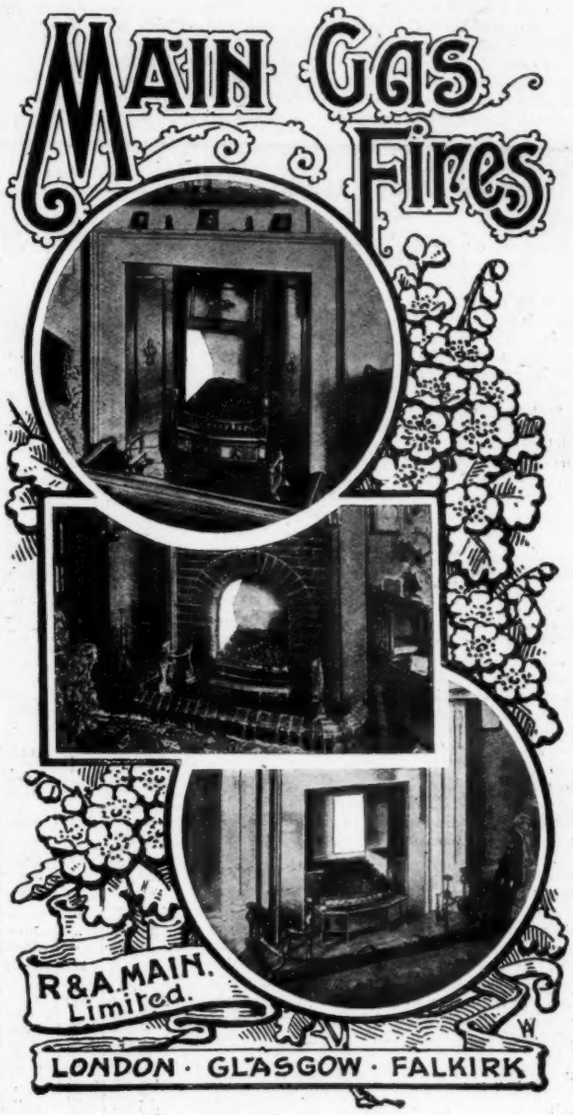
Women employed at the gas-works have asked the Glasgow Corporation for an advance of 5s. a week; and the matter has been referred to a Special Sub-Committee to deal with.

The Portsmouth Corporation have received an application from the Portsea Island Gaslight Company to rent a portion of the Flathouse Wharf for the period of the war and six months afterwards. The Company propose to utilize the site for the deposit of coke, which they estimate from time to time will be about 3000 tons. It has been agreed to let the Company have the site.

During July, the Gas Light and Coke Company suffered two disasters to their fleet of steamers. First the "Flamma" was mined, and twelve days later the "Glow" was torpedoed and sunk by a German submarine. Unhappily, in the latter case the Chief Gunner was killed, and the Steward injured. The Captain, officers, and the remainder of the crew were brought to shore safely. Two more steamers will be available at an early date to fill the gaps thus caused.

The necessary adjustment of the partnership affairs of the Chemical Engineering Company and Wilton's Patent Furnace Company has now been made. Messrs. Norman Wilton and Thomas Owston Wilton, who owned one-half of the business, have purchased the half share of Major George Wilton, who has retired. The business has been converted into a private limited company, which will be known as the Chemical Engineering and Wilton's Patent Furnace Company, and will carry on the business on precisely the same lines as heretofore. Mr. Norman Wilton will become Managing-Director jointly with Mr. T. Owston Wilton.

MAIN'S NEW FOLDER IS READY.



Supplies of this handy List will be sent upon application. It contains the latest information and prices of the popular "Main" Fires, Radiators, &c.

Place your Season's Orders early.

We have commenced our deliveries.

R. & A. MAIN, Ltd.,

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Carnarvon Gas-Works Results.—Reporting upon the accounts of the Carnarvon Corporation for the year ended March 25 last, the Auditor says that, as might have been expected, coal for gas production cost the Corporation £400 more than in the previous year; but the receipts from the sale of gas also show an increase of £350. The revenue account mentions a net profit of £140, compared with £107 for the preceding year.

Lighting and Power Restrictions in New Zealand.—Advices from Wellington (N.Z.) state that regulations imposing certain restrictions upon the use of lighting and motive power derived from gas or electricity produced from coal have been gazetted. According to the Minister in Charge of Munitions and Supplies, the regulations were framed as the result of recommendations submitted by the National Efficiency Board. The primary object of the Government was, if circumstances justified it, to prohibit the use of electric light or gas light produced from coal power for any other than an essential purpose. While the Government generally entertain no desire to restrict the activities or enterprise of business people, it is considered that the position in regard to coal stocks justifies their request to local authorities to consider the curtailment of power that is being utilized for such purposes as advertising, verandah or external lighting, excessive window or internal illumination, and unnecessary street lighting.

A Satisfactory Year at Peterhead.—To the Peterhead Town Council, the Convener submitted a report on the working of the Gas Department for the year to May 15 last, which had proved one of the most satisfactory years in the experience of the undertaking. He also submitted an estimate of the revenue and expenditure for the current year, and moved that the Committee recommend that the price of gas remain as at present—namely, 4s. 8d. per 1000 c.ft. for consumers by ordinary meter, and 4s. 10d. for consumers by prepayment meter. This was agreed to. Subsequently the Town Council passed a vote of thanks to the Gas Committee for the successful results achieved.

Nottingham Gasworkers' Wages.—Anticipations of a considerable period of more settled conditions, following upon the award made some time ago by Sir G. Askwith, conceding most of the employees in the service of the Nottingham Corporation Gas Committee substantial advances of wages, are proving doomed to failure. Already some further heavy demands have been formulated; the men joining, with others, in an application which was made at the last meeting of the Council for an all-round increase which, if granted, would, it was estimated, entail an additional annual expenditure in the Gas Department alone of £20,000. The wages bill in connection with the undertaking has already risen at an alarming rate; and any additions may well be viewed with serious apprehension.

STOCK MARKET REPORT.

Another change—and an unwelcome one—came over the Stock Exchange last week, when markets in general were found to be quite unequal to maintaining the fairly firm attitude which had characterized the close of the week before. The Russian retreat from Riga and the state of affairs in general in that suffering land had much to do with influencing a tone of weakness; and this was intensified by a move to realize profits in numerous lines after the free advances of several past weeks—a move which met with but a chilly response from markets not particularly desirous of buying. Thus the week was persistently dull throughout—falling prices ruled everywhere, and at the close there was no sign of a rally.

In the gilt-edged market, Home Governments held on as well as anything, and War Loan was fairly steady; but Consols were easier. Home Rails had quite a dull time without a gleam of sunshine in any direction. Americans showed no improvement, and Argentines were much depressed by labour troubles and the threat of a general strike.

The Foreign Market showed a few bright spots in Scandinavian, Chinese, and Japanese; but Russians of all sorts were, of course, much depressed and difficult to deal in. South Africans were irregular and for the most part weaker.

In the Miscellaneous group, the general tone was weaker; realizations being the order of the day. This did not affect Rubber much; but Oil, Explosives, and Textiles underwent a reaction.

Business in the Gas Market was quieter. The bulk of the bargains recorded was in Gas Light ordinary, which was in good demand and made a further advance in quotation. Among the rest, there were dealings in some issues which do not often show. Primitivas were very quiet, and had a set back; but all other changes in quotation were in the upward direction—viz., Bombay, British debenture, Imperial Continental, Sheffields, and South Metropolitan.

In the Money Market rates were steady.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 79½, 80, Commercial 4 p.ct. 71¾, Gas Light ordinary 71, 71⅛, 71¼, 71⅜, 71½, ditto debenture 56½, Imperial Continental 83, 83¼, 84, South Metropolitan 72¼, ditto 5 p.ct. preference 94⅜, 94½, 94⅝, 94¾. On Tuesday, Commercial 4 p.ct. 71⅛, European £11 0s. 0d., Gas Light ordinary 71¼, 71⅜, 71¾, 72, 72⅛, ditto preference 71, 71⅛, Imperial Continental 83, 84, Liverpool 81½, Primitiva 46s. 3d., ditto preference 61s. 3d., 63s. 9d., South African 8⅛, South Metropolitan 72¼, 72⅜, 72⅝. On Wednesday, Bournemouth "B" 10 13/16, 10⅞, Gas Light ordinary 71⅛, 72, 72⅛, 73, Malta and Mediterranean 77s. 6d., 78s., South Metropolitan 72. On Thursday, Brentford "A" 80, British 33, ditto debenture 69¼, 70, Commercial 3⅛ p.ct. 65, 65½, ditto debenture 51⅛, Gas Light ordinary 71¾, 72, 72¾, Imperial Continental 84, 84⅛, 85, Monte Video 8. On Friday, Alliance and Dublin 53⅛, Commercial 4 p.ct. 71⅛, 71¾, Gas Light ordinary 72⅜, ditto maximum 56¾, Hastings 3½ p.ct. 48¾, Metropolitan of Melbourne 95¾, Primitiva preference 63s. 9d., South Metropolitan 73½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Prev. Div. or Div. & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	5%	Alliance & Dublin Ord.	59—64	50—55	53½
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅛	5—5½	..
50,000	10	Feb. 26	16	14%	Bournemouth Gas and Water { 10 p.c.	29—30	23—25*	..
888,110	10	,,	7	7%	B 7 p.c.	15—15½	10¼—11*	10 1/8—10⅝
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	8—9½*	..
159,740	—	—	—	4%	4 p.c. Deb.	..	6⅛—7½	..
992,045	Stk.	Feb. 26	14	5 1/16%	Brentford A Consolid.	261—266	78—82	79½—80
734,920	,,	,,	11	4 1/16%	Do. B New	204—209	7 —79	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	33
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	69½—70
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	63—66	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	2—2½	..
100,000	10	—	—	4 1/16%	Do. 4½ p.c. Pref.	4—6	3—4½	..
100,000	Stk.	June 26	4½	4 1/16%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79*	..
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72*	71½—71⅝
560,000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66*	65—65½
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	51½
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c..	..	165—175*	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5 1/16%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	11—12	11/0/9
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas { 4 p.c. Ord.	98—102	71—73	71—73
2,600,000	,,	,,	3½	3 1/16%	Light { 3½ p.c. max.	76—79	56—58	56⅜
4,062,235	,,	,,	4	4%	and { 4 p.c. Con. Pref.	96—99	70—72	71—71½
4,674 850	,,	June 11	3	3%	Coke { 3 p.c. Con. Deb.	72½—74½	55—57	56½
130,000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
2°8,740	,,	Mar. 12	5	4 1/16%	Hastings & St. L. 3½ p.c.	87—89	50—55	48½
70.000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7⅞—8⅛	..
86,600	—	—	—	9%	Hornsey 7 p.c..	..	120—130	..
131,000	Stk.	Mar. 12	7½	7 1/16%	Ilford A and C.	151—154	95—100	..
65,780	,,	,,	6⅜	5 1/16%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4 1/16%	Imperial Continental	150—160	82—87	83—85
1,235,000	,,	Feb. 12	3½	3 1/16%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6 1/16%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211—213	81—82*	81½
					{ B	146—148		
306,068	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3⅜—4	77/6—78/-
250,000	100	April 1	4½	4 1/16%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—98	95½
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8
1,875,892	Stk.	July 29	4½	4 1/16%	Newcastle&Gatsh'dCon.	98½—99½	70—71	..
529,705	,,	June 26	3⅛	3 1/16%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88*	..
100,000	50	,,	12	11%	Do. C	118—121	73—78*	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	2—2½	46/3
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4½—5	3—3½	61/3—63/9
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7⅜—8½	..
125,000	50	July 1	5	5%	{ 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
209,984	,,	,,	10	10%	Do. B	222—224	180—184*	..
633,500	,,	,,	10	10%	Do. C	220—222	..	..
90,000	10	May 28	9	6/-	South African	10½—11⅛	8½—9½	8½
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	72—74*	..
—	—	—	—	—	Do. Pref.	—	—	94½—94⅝
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	..
224,220	,,	Feb. 26	8½	7 1/16%	South Shields Con. Stk.	157—159	137—139*	..
952,795	,,	,,	6	4 1/16%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	..
90,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4 1/16%	Do. West Kent	..	..	..
197,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5 1/16%	Tottenham { A 5 p.c.	135—138	92—97*	..
782,275	,,	,,	6	4%	District { B 3½ p.c.	115—117	66—71*	..
181,255	,,	June 26	4	4%	{ 4 p.c. Deb.	87—89	63—65	..
189,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	89—91	..
80,000	,,	Feb. 26	8⅜	7 1/16%	Wandsworth, Wimbledon, and Epsom—			
255,836	,,	,,	6⅝	5 7/16%	Wandsworth A 5 p.c..	151—156	112—117*	..
108,075	,,	,,	5/17/3	50/9	Do. B 3½ p.c.	129—134	97—99*	..
352,000	,,	,,	6⅛	5 1/3%	Do. C 3½ p.c.	110—115	84—89*	..
98,000	,,	,,	6½	5 7/16%	Wimbledon 5 p.c.	117—122	85—90*	..
88,416	,,	June 26	3	3%	Epsom 5 p.c.	121—126	93—98*	..
					3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

H. MITCHELL, FOR PATENT SLOT METER PAD & OTHER LEGAL. KENTISH TOWN, N.W. | W. & J. BURNSTER, LTD., 14 & 15 Goss Manchester.